RICE UNIVERSITY

Constructions, Semantic Compatibility, and Coercion: An Empirical Usage-based Approach

by

Soyeon Yoon

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

Doctor of Philosophy

APPROVED, THESIS COMMITTEE

Suzanne Kemmer, Associate Professor
Linguistics
Director, Cognitive Sciences

Michel Achard, Associate Professor
Linguistics

Nicoletta Orlandi, Assistant Professor
Philosophy

Amy Franklin, Assistant Professor
National Center for Cognitive Informatics
and Decision Making, School of
Biomedical Informatics, University of
Texas Health Science Center Houston

HOUSTON, TEXAS

ABSTRACT

Constructions, Semantic Compatibility, and Coercion:

An Empirical Usage-based Approach

by

Soyeon Yoon

This study investigates the nature of semantic compatibility between constructions and lexical items that occur in them in relation with language use, and the related concept, coercion, based on a usage-based approach to language, in which linguistic knowledge (grammar) is grounded in language use.

This study shows that semantic compatibility between linguistic elements is a gradient phenomenon, and that speakers' knowledge about the degree of semantic compatibility is intimately correlated with language use. To show this, I investigate two constructions of English: the sentential complement construction and the ditransitive construction. I observe speakers' knowledge of the semantic compatibility between the constructions and lexical items and compared it with empirical data obtained from linguistic corpora and experiments on sentence processing and acceptability judgments. My findings specifically show that the relative semantic compatibility of the lexical items and the construction is significantly correlated with the frequency of use of their co-occurrences and the processing effort and speakers' acceptability judgments for the co-occurrences.

The empirical data show that a lexical item and a construction which are less than fully compatible can be actually used together when the incompatibility is resolved. The resolution of the semantic incompatibility between the lexical item and its host

construction has been called coercion. Coercion has been invoked as a theoretical concept without being examined in depth, particularly without regard to language use. By correlating degree of semantic compatibility with empirical data of language use, this study highlights that coercion is an actual psychological process which occurs during the composition of linguistic elements. Moreover, by examining in detail how the semantics of a lexical item and a construction interact in order to reconcile the incompatibility, this study reveals that coercion is semantic integration that involves not only dynamic interaction of linguistic components but also non-linguistic contexts.

Investigating semantic compatibility and coercion in detail with empirical data tells about the processes by which speakers compose linguistic elements into larger units. It also supports the assumption of the usage-based model that grammar and usage are not independent, and ultimately sheds light on the dynamic aspect of our linguistic system.

ACKNOWLEDGEMENTS

I am truly grateful to the four professors on my committee, Professor Suzanne Kemmer, Professor Michel Achard, Professor Nicoletta Orlandi, and Professor Amy Franklin, for their kind guidance and profound insights.

My advisor, Professor Suzanne Kemmer, has always guided me through investigating many interesting linguistic phenomena and given me intellectual inspiration. She spent a lot of time with me shaping up and specifying the ideas in the thesis. She has always encouraged me with patience throughout the long journey of writing my thesis. Suzanne, I will never forget your kindness and intellectual guidance, and will keep trying to become a good linguist just like you.

My parents and parent in law deserve acknowledgement for their love. They have always supported me in many ways when I stayed and studied in the U.S. Mom and Dad, I love you!

I would like to thank Professor Robert Englebretson, Professor Sydney Lamb, Professor Nancy Niedzielski, Professor Masayoshi Shibatani, Prefossor Stephen A. Tyler, and Professor Christina M. Willis of the Department of Linguistics at Rice University for their teaching and support. Also, I remember Professor Katherine Crosswhite and Professor Claire Bowern, who were once faculty members at Rice, for their help. I specially appreciate Ki-Sun Hong of Seoul National University for her care for me.

I thank Rita Riley, the department coordinator, for her kind help at every turn.

I met good colleagues here in the department of Linguistics at Rice University. They not only gave me intellectual stimulation as colleagues but also made my life more enjoyable as friends: Haowen Jiang, Sarah Lee, Ling Ma, Chelsea McCracken, Carlos

Molina-Vital, Katie Nelson, Piotr Nowak, Ann Marie Olivo, Cassandra Pace, Christopher Schmidt; and Alumni, Elizabeth Gentry Brunner, Michael Colley, Anne-Marie Hartenstein, Martin Hilpert, Jennifer Hoecker, Jayeon Jeong, David Katten, Christian Koops, Linda Lanz, Gujing Lin, Michelle Morrison, Naonori Nagaya, Andrew Pantos, Monica Sanaphre, Pumsup Shim, and Christopher Taylor. Also, Jennifer Walls, one of the students in my Ling200 class, was very kind to help me proofread this dissertation.

Finally, I dedicate this humble dissertation of mine to God and my precious ones, my husband and my son, who were there right by me in every moment.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. Introduction

This study attempts to investigate the nature of semantic compatibility between constructions and lexical items that occur in them in relation with language use, and the related concept, coercion, from a usage-based approach to language (Langacker, 1988 and elsewhere, Kemmer and Barlow 2000, and Kemmer 2005 and 2008).

The usage-based model, proposed by Langacker (1988), assumes that language use intimately interacts with grammar: not only are linguistic utterances produced based on grammar but also their usage contributes to forming grammar. Based on the tenets of the usage-based model, it is predicted that the linguistic knowledge about semantic compatibility between a lexical item and a construction is closely related with how the elements co-occur with each other in language use. This study supports this hypothesized relation by showing that semantic compatibility between linguistic elements is a gradient phenomenon, and this degree of semantic compatibility is correlated with frequency of usage, processing effort, and acceptability judgments. The empirical data of language use are derived from large text corpora, and experiments of processing and acceptability judgments.

The empirical data show that a lexical item and a construction which are incompatible can be used together when the incompatibility is resolved. For example, in *John cut Jane a belt,* a stimulus sentence used in the experiment in this study, the verb *cut* is not semantically perfectly compatible with the ditransitive construction, but speakers resolve the incompatibility using particular interpretation strategies. The resolution of the semantic incompatibility between the lexical item and the construction in which the lexical item occurs, has been called **coercion** (Croft 1991, Michaelis 2005, Panther and Thornburg 1999, 2000, Piñango et al. 2006, Ziegeler 2007a, 2007b). Coercion is a concept which has been invoked without being examined in depth, particularly with regard to language use. Studying coercion in detail is important because coercion is used in explaining the deviation in composition of linguistic elements: linguistic elements, which are not semantically compatible, and thus predicted not to be used together in a sentence, are actually used together. In this study, by correlating degree of semantic compatibility with empirical data of language use, I will examine the gradient nature of coercion and how the semantics of a lexical item and a construction interact in order to reconcile the incompatibility.

Investigating semantic compatibility and coercion in detail with empirical data will tell us about the processes by which speakers deploy and understand sentences, particularly when composing linguistic elements into larger units, and will ultimately shed light on the dynamic and flexible aspect of our linguistic system.

1.1. Aim of the Study

The present study aims to understand the nature of semantic compatibility between a lexical item and a construction and coercion in relation with empirical data of language use. To develop the aim of this study more specifically, I will start with some general background.

In Construction Grammar (Goldberg 1995, 1997, 1998, 2006, Michaelis 2005), a construction, as the basic unit of linguistic organization, is defined as a conventionalized pairing of form and meaning (Goldberg 1995, 2006). On this view, not only individual lexical items but also a schematic syntactic frame is a construction, which has its own conventionalized meaning and contributes to the meaning of the whole expression in combination with the semantics of the lexical items that occur in the syntactic frame. For example, in the case of the "caused-motion construction" (Goldberg 1995: 152) as in (1), the form of the construction, [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]] (V is a non-stative verb and OBL is a directional phrase), is paired with and conveys the meaning that an entity *i* causes *j* to move along a path designated by the directional phrase.

(1) I *pushed* the box into the room.

On the Construction Grammar view, since a construction has a meaning, when lexical items occur in the construction, the constructional meaning must be considered along with the lexical meaning in order for a sentence to be "grammatically well-formed." For example, in order for a verb to occur in the caused-motion construction, the semantic properties of the verb should fit those of the construction.

In (1), *push* subcategorizes for a subject, an object, and PP of direction, so it readily occurs in the syntactic frame [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]]. Moreover, this verb denotes the meaning of 'moving an object to another place by means of pushing' and this lexical meaning fits the constructional meaning as well. Therefore, the verb *push* can occur in this construction with no problem.

However, the verb *remember* is not likely to occur in [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]], as in (2).

(2) *I *remembered* the box into the room.

In (2), the verb *remember* prototypically does not involve any motion or direction. This lexical meaning mismatches the constructional meaning which involves "moving an entity along a path to a direction." Thus, the use of *remember* in the construction [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]] is unacceptable.[1]

Interestingly, however, in (3) the use of *sneeze* with the caused-motion construction is still acceptable.

(3) She *sneezed* the foam off the cappuccino. (Goldberg 2006: 42)

The verb *sneeze* typically does not independently license the direct object complement and a PP (Goldberg 1995: 154) and it does not entail motion. Thus, in this sense, we would not expect *sneeze* to occur in the construction [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]], because the subcategorization frame and semantics of *sneeze* do not fit the syntax and semantics of [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]]. However, this semantic conflict can be resolved resulting in the interpretation, 'she moved the foam off the cappuccino by sneezing.' The conventional meaning of the construction provides the meaning of "moving an entity along a path" while *sneeze* can be construed as the manner of moving an entity. We can easily imagine a conventional scene where the force which is generated when sneezing

[1] The use of *remember* in the caused-motion construction is unacceptable in typical situations. However, (2) might be acceptable if an appropriate context is posited, as will be discussed later in this section.

(Goldberg 1995: 27) causes an entity like foam to move from the top of the cappuccino cup. Therefore, native speakers of English will judge this sentence quite acceptable.

Let us discuss another example in (4).

(4) ?? Farmer Joe grew those vines onto his roof. (Goldberg 1995: 169)

In this sentence, *grow* is not a verb which typically licenses a PP. Also, the conventional meaning of *grow* in transitive sentences does not entail a motion meaning. For example, the direct object of *grow* in sentences like *We grow corn* is not an entity that is seen as moving through space. Therefore, it is not expected to occur with the caused-motion construction. (4) is less acceptable than (3) because, according to Goldberg (1995: 169), the whole scene of (4) is not conventional: planting and watering is not a conventional way to grow plants *onto the roof*. However, if the situation is that Joe used wires and bars to support the vines so they can reach the roof, the vines move to the top of the roof even though the motion of the vines is very slow. In this context, the use of *grow* in the caused-motion construction is considered more acceptable than in the conventional situation of growing plants. In other words, particular aspects of context can make an unacceptable sentence more acceptable.

(1)-(4) show that the fit of the co-occurrence of a lexical item and a construction cannot be divided into two classes: "fits" or "does not fit." Rather, there is a cline between "fit" and "not fit." There can be cases where the two elements "somewhat fit." The fit of the co-occurrence of a lexical item and a construction in which the lexical item occurs has been called "compatibility." (1)-(4) show that there are degrees in semantic compatibility between a lexical item and a construction it is used with: the verb and the caused-motion construction in (1) are the most semantically compatible, the co-occurrence in (3) shows less compatibility, the one in (4) shows even less compatibility, and the one (2) shows the least compatibility. Specifically, the examples (3) and (4) show that a lexical item and a construction that are not obviously compatible can be used together.[2]

When there is apparent incompatibility between the semantics of a syntactic structure and a lexical item that occurs in it, the conflict can sometimes be resolved as in the examples of (3) and (4), making their co-occurrence acceptable, and this reconciliation has been called *coercion* (Croft 1991, Michaelis 2005, Panther and Thornburg 1999, 2000, Piñango et al. 2006, Ziegeler 2007a, 2007b). Most of the studies that involve coercion so far (Croft 1991, Michaelis 2005, Panther and Thornburg 1999, 2000, Piñango et al. 2006, Pustejovsky 1989, 1995, Ziegeler 2007a, 2007b) have used the concept of coercion as an account for the unexpected co-occurrence despite apparent semantic incompatibility as opposed to the expected co-occurrence of compatible linguistic items.

Even though some of the previous studies involving coercion, cited above, presumably view compatibility as gradable, the cases of different degrees of semantic compatibility have not seriously focused on. This is probably due to the definition of the

---

[2] Goldberg (1995) used the examples (3) and (4) to show that constructions have a meaning by claiming that the caused-motion meaning of the whole sentence came from the construction. However, I took a different angle and use these examples to show that there are degrees of semantic compatibility between a lexical item and a construction.

coercion, "resolution" of semantic "incompatibility," which does not imply gradient nature of semantic compatibility. More specifically, the example expressions in the previous studies were studied on the assumption that two elements are "incompatible" and this incompatibility is "resolved." On this view, (3) and (4) are not different in that the verbs and the caused-motion construction are incompatible and the incompatibility was resolved, i.e. coercion occurs. In this way, coercion has been spoken of as if it were a binary concept: coercion is said to 'occurring' to resolve the incompatibility or 'non-occurring' when there is no incompatibility to be resolved.

However, It is possible that there are the cases where two elements in an expression are incompatible, but the incompatibility is not resolved and the expression is judged not very acceptable in the end. For example, people may judge the co-occurrence of *remember* and the caused-motion construction as in (2) unacceptable because they are semantically incompatible. However, it does not mean that speakers do not even try to resolve the incompatibility at all and judge the sentence unacceptable. Rather, it is possible that speakers try to resolve the incompatibility but fail to resolve it. Nevertheless, the studies involving coercion (Michaelis 2005, Panther and Thornburg 1999, 2000, Pustejovsky 1989, 1995)[3] did not focus on effort of the speakers to resolve the incompatibility, if the incompatibility is not resolved. They viewed coercion as a theoretical explanation about the cases with "resolved" incompatibility, but the psychological process toward the resolution was not dealt with.

In this study, however, I attempt to challenge the way the previous studies speak

[3] Psycholinguistic studies on coercion such as Piñango et al. (2006) relate processing effort with coercion. I will discuss these psycholinguistic studies in 1.3.

about coercion, which is, binary views on semantic compatibility (as compatible or incompatible) and coercion (as occurring or not occurring). If we accept the concept of a cline of semantic compatibility, coercion, which is the resolution of the incompatibility, can be conceived as gradable concept. Specifically, I will show that coercion is a processing strategy that is as gradable as semantic compatibility. For example, there is little or no conflict between *push* and the construction in (1), so no or very little coercion may be involved. On the other hand, the incompatibility in (3) can be resolved with a little more effort, while the incompatibility in (4) may be resolved with even more effort to incorporate extra-linguistic contextual elements. However, there is great amount of incompatibility between *remain* and the construction in (2), so this conflict is much harder to resolve. Nevertheless, I hypothesize and will be shown in Chapter 5 that speakers will often still try to resolve the incompatibility. If they take a lot of processing effort and exploit appropriate context, even this great incompatibility may be resolved. For example, (2) may be used in a science fiction in the meaning 'I caused the box to move into the room by remembering the box.' Therefore, I will not exclude such cases as (2) in which the incompatibility between the lexical item and the construction is not likely to be resolved, because the processing effort to resolve the incompatibility is considered as "coercion."

Moreover, the fact that coercion is a phenomenon that involves various linguistic factors and cognitive processes has not been dealt with in depth in previous studies (Croft 1991, Michaelis 2005, Panther and Thornburg 1999, 2000, Piñango et al. 2006). For example, in order to make (3) more acceptable, speakers need to consider the force involved in the action of sneezing which sets the foam into motion. Also in (4), speakers need to employ extra-linguistic context where this expression might be used. Therefore, when semantic incompatibility is resolved, we need to closely examine what factors are taken account of.

In most cases, researchers invoking coercion have depended on made-up examples, and analyzed them based on the researchers' own intuitions. However, as will be discussed in depth in 1.4, language use interacts intimately with the linguistic system, so relying on the researcher's intuition and on made-up examples may not correctly represent speakers' linguistic knowledge.

Improving these shortcomings of previous studies, I will approach semantic compatibility and coercion based on the assumptions of the usage-based model (Langacker 1987, 1988, Kemmer and Barlow 2000, Kemmer 2005, 2008) that language use reflects as well as contributes to a speaker's linguistic system. I will test this assumption by correlating semantic compatibility with empirical data based on language use on the hypothesis that the co-occurrence of a lexical item and a construction that are semantically more compatible are more frequently used, processed faster, and judged more acceptable. Based on the correlation between the language use and linguistic knowledge, I will examine coercion in detail and attempt to show that coercion is a processing strategy, that has a gradient characteristic, involving various linguistic / non-linguistic factors.

As the first step toward the discussion of the correlation of language use and linguistic knowledge about semantic compatibility and coercion in depth, the next section will introduce the basic concepts of constructions and semantic compatibility.

1.2. Constructions and Semantic Compatibility

Unlike the traditional generative linguistic view (Chomsky 1965, 1995, Newmeyer 2003), in Construction Grammar (Goldberg 1995, 1997, 1998, 2006, Michaelis 2005), there is no sharp distinction between lexicon and syntax (Goldberg 1995). For example, a lexical item *bird* and a ditransitive construction [S V O_i O_d] are not very different in that they are both a pairing of form and meaning, i.e. a linguistic sign in the sense of Saussure (1916). Thus, a ditransitive construction and a lexical item *bird* are posited on the continuum of constructions between more abstract, schematic construction and a more specific construction: the former is closer to the schematic construction and the latter is closer to the specific construction.[4]

This study basically accepts the view of Construction Grammar that a construction is a concept of continuum encompassing both lexicon and syntax. Nevertheless, in order to discuss the semantic compatibility between a "lexical item" and "construction" and coercion, it is still useful to use these terms distinctively. I will refer to a linguistic unit of a word level, which is syntactically simple and lexically specific, such as *the, bird, remember*, and *push*, as a lexical item. I will refer to a more schematic linguistic unit,

[4] In Construction Grammar, in order for a linguistic unit to be a construction, some aspects of its meaning should be unpredictable from its composite elements. On the other hand, according to Langacker (2005), who proposed the usage-based model, unpredictability of a construction is not important because a construction is established when the expression is cognitively entrenched and conventional. Also, on this view, there is no distinctive point where any expression (e.g. a ditransitive construction, a fixed expression *I love you*) becomes idiosyncratic. Following Langacker's (2005) view, in this paper, I will not discuss unpredictability of a construction.

which is syntactically more complex and at least partially lexically unspecified, such as [*a* N], [*a lot of* NP], [*begin* V-*ing*], [[NPj [V NPj's *way* OBL]] and [V NP1 NP2], as a construction.

The meaning of a schematic construction such as [S V O_i O_d] or [S V O] is not specific enough to provide a complete conceptualization (Goldberg 1995: 30). For example, the meaning of the prototypical transitive construction [S V O] in English is 'X ACTS ON Y IN M MANNER.'[5] Without a specific verb, there is no way to interpret what kind of action the expression indicates. It can be 'X kissed Y' or 'X hit Y.' Therefore, the construction needs to be filled in and elaborated by lexical items.

It is well known, however, that not all lexical items can freely fill in the empty slots in a construction (Goldberg 1998, Israel 1996). As we have seen in (2), for example, when *remember* is used in the caused-motion construction, the sentence is not very natural. On the other hand, *push* can be used in the caused-motion construction naturally as in (1), showing that a lexical item which is semantically compatible with the construction can be used with the construction without any trouble. In order for the verb meaning and the constructional meaning are compatible to be used together and compose a larger unit, what we know about the semantic specifications of the verb must be consistent with the semantic specifications of the construction.

Explaining how certain linguistic units can be combined has traditionally rested on

---

[5] Not all transitive sentences in English share the meaning 'X ACTS ON Y IN M MANNER.' For example, *John loves Mary* does not involve any action. Thus, the meaning 'X ACTS ON Y IN M MANNER' is the prototypical meaning, rather than the meaning that encompasses all transitive sentences. The prototypical meaning will be discussed in more detail later in this section.

semantic features such as [+tall] and [-male]. For example, using the semantic features, *They swim in the water* is judged acceptable because *swim* and *water* are semantically compatible because both are specified with [+liquid]. On the other hand, *They swim on the rock* is not acceptable because *rock* is specified with [- liquid / + solid]. Even though there is no obvious claim to advocate using semantic features, much of literature (Sag and Wasow 1999, Michaelis 2005 among many others) that model linguistic compositionality exploits semantic features. As will be shown in later sections, much literature on coercion also uses semantic features to explain the compatibility/incompatibility between a lexical item and a construction. For example, a count noun *beer* cannot naturally occur in the construction [*a* N] because *beer* is specified with [- bounded] whereas the construction is [+ bounded] (Michaelis 2005). The NP *the book* cannot naturally occur in the construction [*begin* X_{event}] (Pustejovsky, 1995), because the construction requires a complement designating an event while *the book* is specified with [ENTITY].

In the view adopted here, however, semantic specifications are not simply fixed semantic features. Bolinger (1965), in a seminal article, captures the intractable problems of positing semantic features. One of the problems is that deciding which pieces of knowledge count as semantic features is arbitrary. For example, with semantic features, we can define the word *bachelor* in the sense of “a man who has never married” as [+male], [+adult] and [-married]. Then, we can still narrow down its definition by using more specific features such as [-cleric] and [-ever married before] in order to exclude the Pope and gay men. However, how specific must they be? Also, we do not utter sentences like *He broke the bachelor in two* (Bolinger 1965: 564) because we know that bachelors, being animals/humans, are not rigid, and therefore, not breakable. Do we need to mark this kind of latent feature for *bachelor*? This considerations lead to the conclusion that, with these limited number of fixed features, we cannot sufficiently describe the meaning of a word.

Another problem with semantic features is that the boundary between the linguistic knowledge and the knowledge about the world is unclear (Bolinger 1965). In the sentence *He became a bachelor in 2005*, the best sense of *bachelor* is 'one who possesses the first or lowest academic degree.' We know that *bachelor* in this sentence does not mean 'a man who has never married' because one cannot 'become' a man who has never married. We also exclude another sense of *bachelor* which is 'a young knight serving under the standard of another knight' because we know that knighthood does not exist in 2005. Is this the knowledge of one's language or the knowledge about the world? Any decision of this type must be arbitrary and not based on a real difference in types of information. Therefore, setting up semantic features is not an appropriate way to define semantic specifications of words.

Rather, following Fillmore (1975) and other researchers (Langacker 1987 and Goldberg 1995: 25), I assume that semantic specifications are defined relative to some particular background frame or scene. A semantic frame is a coherent structure of related concepts with particular culturally embedded scene from human experience (Evans and Green 2006: 222). The meaning of a word can only be understood with its associated frame. On this view, a *bachelor* in the sense of 'a man who has never married' can be defined only against the background of the frame of cultural knowledge about marriage and eligibility of marriage.

The importance of the extra-linguistic knowledge when understanding a concept is also emphasized by Lakoff (1987) with his concept of the Idealized Cognitive Model (ICM), which is similar to the idea of Fillmore's frame. An ICM is a conventionalized way of organizing knowledge about a concept. ICMs are 'directly *embodied* with respect to their content... [usually] with respect to use. [They] structure thought and are used in forming categories.' (Lakoff 1987:13). When we talk about a *bachelor*, we define this term with respect to the ICM, which is a human society where there is a system of marriage between a man and a woman, and there is an expected age for marriage. There are 'prototypical' cases which this ICM fits well, such as a 29 year old single man who is looking for a woman who he can marry. However, we don't call a priest or a gay man *bachelor* because they do not belong to the ICM of *bachelor* (Lakoff 1987: 70). The conclusion from the example of *bachelor* is that the semantic specifications of a word or a construction are not defined by fixed features. Rather, they are defined by our use and experience about the concept of the words and the constructions.

Based on these characteristics of semantic specifications, we can conclude that semantic compatibility between linguistic components is not a matter of the fit of semantic features. Rather, it is a matter of consistency between the cognitive models (semantic frames or ICMs, discussed above) of the linguistic components.

We can then define semantic compatibility between two or more linguistic components as the following: the prototypical semantic specifications of the two linguistic components must be conceptually consistent. For "the prototypical semantic specification" in this definition, I adopt the prototype model (Rosch 1973, 1977) in which a category is defined with reference of a prototype, i.e. a schematized representation of typical instances (Langacker, 1988: 133), following Langacker (1988) and many other linguists of Construction Grammar and cognitive linguistics. In order for two linguistic elements to be semantically compatible, their prototypical semantic specifications, evoked by the semantic frames or ICMs of the linguistic elements, schematized from the typical instances, should be conceptually consistent.

Take the example of [X [*under the table*] (Langacker 1987: 279). The semantic specifications of [*under the table*] are evoked by the semantic frame or ICM of [*under the table*]: all prototypical concepts related with a table such as height, size, color, material, and function, relational position evoked by *under* and the schematic concepts of a prototypical entity that may be placed under the table. The entity is not explicitly made reference to in the linguistic expression. For this expression alone, it is just an implicit entity. It is not yet elaborated by a more specific and conceptually consistent linguistic item. When we compose a larger structure such as a noun phrase [X [*under the table*]], we look for an entity X whose meaning fits the meaning of [*under the table*]. In other words, semantic specifications of the X are expected to be consistent with the semantic specification of this noun phrase which includes the constituent [*under the table*]. In other words, X and the construction [X [*under the table*]] are expected to be semantically compatible. A *football* is a good candidate for the entity occurring with [*under the table*]: what we know about a typical football is consistent with the kind of things that can be under the table. It is a concrete thing, small enough to be located under the table, etc. Therefore, *football* is highly compatible with *under the table*. With the knowledge of the prototypical meaning of a word and the prototypical meaning of the construction, we can tell whether or not a lexical item and the construction are semantically compatible.

Since semantic specifications of linguistic elements are richly complex as the ICMs and semantic frames suggest, the "semantic compatibility," which is the consistency of semantic specifications of the linguistic elements, is a more complex concept than has been thought. Truly, speakers seem to be sensitive to it, as they use semantically more compatible elements together more often than semantically less compatible elements, which will be shown in 2.4 and Chapter 4. Also, they process the co-occurrence of semantically more compatible elements faster than the one of less compatible elements, which will be discussed in 2.3 and Chapter 5. This means speakers implicitly know about semantic compatibility among the elements. Even when they are asked for meta-linguistic judgments, they judge the co-occurrence of more compatible elements more acceptable than the one of less compatible elements, as will be shown in 2.2 and Chapter 5. Nevertheless, as will be discussed in 1.4.1, and exemplified in 2.1 and Chapter 3, describing and demonstrating what elements are semantically compatible require complex linguistic analysis, involving prototype and schematic representations of the linguistic elements, extra-linguistic knowledge, and context.

Also, as the semantic frame or ICM of linguistic elements is complex, the consistency of their prototypical meaning, i.e. semantic compatibility is expected to be gradable, rather than a binary division, dividing neatly into "compatible" and "incompatible," as was shown in 1.1. The examples of the caused-motion construction in (1)-(4) show some different degrees of semantic compatibility of a verb used in this construction. We have seen that there are verbs that have intermediate compatibility with the construction. For example, the prototypical meaning of *sneeze* and *grow* are not perfectly compatible with the caused-motion construction. The ICMs of both *sneeze* and *grow* do not contain the semantic specification of causing a motion through a path, and thus, the semantic specification of these verbs in their prototypical sense are not consistent with those of the caused-motion construction. Nevertheless, the co-occurrence of these verbs and the construction becomes acceptable when they are interpreted as a non-prototypical meaning: *sneeze* is interpreted as the manner of causing an entity to move along the path in (3), and *grow* is posited with non-prototypical scene of growing, like using poles so that the plants can reach the roof, as in (4). These considerations show that a lexical item that is not perfectly compatible with a construction in their most prototypical senses still can be interpreted and used in the construction by some accommodation to their less prototypical senses. Consequently, semantic compatibility is a matter of degree which allows different degrees between the poles of "the most compatible" and "the least compatible," and not perfectly compatible elements can be used together when their incompatible meanings are accommodated.

The reconciliation of the incompatibility between the constructional meaning and the lexical meaning is called *coercion*. In the next section, I will consider the concept of coercion more in depth, and review the studies most relevant to the concept of coercion.

1.3. Coercion

Originally, coercion was a term used in computer science referring to changing an entity of

one data type into another (Levinson 2000:246).[6] For instance, there might exist values *a,*

---

[6] I would like to thank Antonietta Alonge, Damon Allen Davison, Phillip Elliott, Michele Feist, Joshua Marker, Francisco Ruiz de Mendoza, and Chris Taylor for helping to provide historical the information about the origin of the concept of "coercion."

b, and *c* whose data types are *weight, height,* and *age*, respectively as in (5).

(5) type value

weight	a
height	b
age	c

The data types in (5) are different from one another, and these data types can be converted to equal data types, if needed, to perform an operation such as comparing and adding the values. This type conversion has been called coercion in computer science.

Later, linguists (e.g. Pustejovsky 1989) adopted this term in the description of linguistic semantics. Coercion in this sense is a semantic operation that converts an argument to the type that is expected by a predicate, where the use of the argument would otherwise result in a type error (Pustejovsky 1995:77). For example, the argument structure of *begin* contains elements representing a human and an event, described as [ARG1 = [human] / ARG2 = [event]]. A typical sentence with *begin* is *John began to read a novel* where the first argument is a noun representing a human and the second argument is a *to*-infinitive clause representing an event. But we find other cases in which we understand similar situations but there is a problem in compositionality: the complement of *begin* is a noun that does not designate an event as in *John began a novel*. Via a λ-operation used in formal semantics, the noun argument must be interpretationally coerced into an [event] such as 'reading (or writing) a novel.' Thus, *John began a novel* is understood to mean 'John began to read (or write) a novel.'

Linguists who work on the interface of syntax and semantics such as the Construction Grammarians (Michaelis 2005) have used the term coercion when explaining the resolution of incompatibilities between the requirements of a syntactic frame or a construction and lexical items that occur in it. For example, Michaelis (2004, 2005) claims that constructions are responsible for coerced meaning. In *I'm liking your explanation* (Michaelis 2004: 36), the ACTIVITY feature in the progressive construction wins out over the STATE feature of the input lexical item, *like*. Therefore, *like* is interpreted as a "temporary state" which only holds during a certain period.

Coercion has been studied from the cognitive linguistic approach (Panther and Thornburg 1999, Traugott 2007, and Ziegeler 2007a) as well. For example, the coercion effect of saying *I want a beer* instead of saying *I want a glass of beer* has been explained as an instance of the metonymy CONTAINED FOR CONTAINER (Kövecses and Radden 1998:58). The metonymic account will be discussed in detail in 1.3.1.

The notion of coercion has also been adopted in the literature on language processing. Piñango et al. 1999 and Piñango et al. 2006 investigated aspectual coercion, one type of coercion. For example, according to Piñango et al. (2006:235), *The insect hopped until it reached the far end of the garden* requires coercion because the verb *hop* is a bounded event, so additional temporal boundary cannot occur with a bounded event. Thus, in order to make this sentence acceptable, we coerce the verb to have an iterative meaning. This study claims that speakers detect that they will need to coerce this sentence 250ms after they read *until* in which point the semantic property of *hop* and that of the clause following *until* are not consistent. More generally speaking, speakers recognize that coercion is required as late as 250 ms after the point where the syntactic structure diverges from what is expected by the lexical meaning. These studies showed when coercion occurs in the course of processing.

Other experiments have shown that expressions involving coercion requires more processing effort compared to the expressions without coercion (McElree et al. 2001, Traxler et al. 2005). For example, Traxler et al. (2005) compared the time to process a certain word in a sentence where coercion is involved and the time to process the corresponding word in a sentence where coercion is not involved. *The author was starting the book in his house* involves coercion because we often expect that an event in the form of gerund or *to*-infinitive complement occurs in the construction [*start* ___] while the complement used in this sentence is a noun designating a non-event entity. On the other hand, *The author was writing the book in his house* does not involve coercion. The result of the processing experiment is that speakers process the word following the noun (i.e. *in*) with more difficulty for the coerced expression. This study claimed that this processing cost arises from the online construction of a sense not lexically stored or available in the immediate discourse (Traxler et al. 2005). In order to confirm this claim, they conducted three more subsequent experiments that filter out the possibility that processing is delayed due to inferring the correct interpretation about the noun by using more accessible and frequently used nouns (e.g. *house* instead of *condominium* and *alcohol* instead of *champagne*). They also filtered out the influence of referring back to the given context, or disruption due to the repeated noun both in the context and the target sentence. Based on the results, they concluded that the cost comes from converting the type of the complement, which is an entity (*book*), to an event (*writing the book*).

These experiments on coercion show that coercion is a psychological phenomenon that occurs during the course of processing and it requires more processing effort. This suggests that coercion can be studied more in depth from the perspective of processing. If we accept that there are different degrees of semantic compatibility between a lexical item and its host construction, a question is raised: what happens in language processing if the semantic compatibility between linguistic elements gets different? None of these studies investigating coercion from the processing perspective has focused on the possible processing difference depending on different degrees of semantic compatibility. For example, even though Traxler et al. (2005) tested several constructions that are composed of an event-taking verb followed by an entity noun such as *start the book*, *start a picture*, *enjoy the champagne*, and *finish a letter*, they have not focused on the possibility that some of the co-occurrences might require different processing effort depending on different semantic compatibility.

This study, however, attempts to investigate coercion processing in relation to different degrees of semantic compatibility. If we assume that coercion is a processing phenomenon, then, we might expect to find some differences in processing effort involved in semantic compositionality depending on the degree of semantic compatibility between a lexical item and its host construction. In short, difference in degree of semantic compatibility should require difference in ease of coercion, and I expect that this might be reflected in difference in processing time. Therefore, in this study, using the empirical data of processing time, I attempt to show the gradability of processing effort to resolve the different degrees of semantic incompatibility.

In sum, I have shown that coercion has been used to explain the phenomena in which there is some incompatibility between the syntactic frame and co-occurring lexical items in various theoretical frame works, and that there is more to investigate to coercion: it relates to actual psychological processing and it may relate to degree of semantic compatibility.

The next step is to look deeper into what kinds of coercion there are. Michaelis (2005) divides coercion into three types based on the types of syntactic structure and semantics where the incompatibility arises: nominal coercion, aspectual coercion, and argument structure construction coercion. In addition to these three types, I add complement coercion, following Ziegeler (2007). The following sections will introduce these four different kinds of coercion studied in the literature. I will show what investigations have been done on them, and discuss what we can further explore.

1.3.1. Nominal Coercion

Nominal coercion occurs within an NP. Michaelis (2005) uses the term "nominal coercion" specifically for the type where the property which determines whether the head noun is a count noun or a mass noun does not match the property required by the morphosyntactic construction of the NP as in (5) and (6) (Michaelis 2005).[7]

---

[7] Michaelis introduces two kinds of type-shiftings, i.e. explicit type-shifting and implicit type-shifting (which is coercion), when there is a mismatch between the linguistic components. Explicit type-shifting shifts the designation of the lexical item when the construction type is conventionally associated with that item (Michaelis 2003: 272). For example, the Partitive Construction like *a piece of bread*, shifts the unbounded type (*bread*) to a bounded type, via unification with a construction referring to a bounded entity (Traugott 2006). However, according to Michaelis (2003), the explicit type-shifting is not considered as coercion, because the

(6)You have *apple* on your shirt. (Michaelis 2005: 52)

(7) She had *a beer*. (Michaelis 2005: 46)

Michaelis (2005), in a Construction Grammar account, explains that this type of incompatibility arises from the mismatch of the boundedness of the head noun and that of the NP in which the noun is embedded. In her account, a count noun is marked as [bounded +] while a mass noun is marked as [bounded -]. When there is an indefinite article in the NP, this NP frame requires a noun specified as [bounded +]. When there is no indefinite article in the NP, a noun specified as [bounded -] is required.

In (6), there is no article in the construction, which means that this NP requires a noun of [bounded -]. However, *apple* is usually considered as a count noun (thus, [bounded +]) but it occurs in the syntactic frame shown in (6). In this case, a Construction Grammar account assumes that the count noun is coerced into a mass noun interpretation: some amount of apple is on the shirt. As a mechanism for coercion, Michaelis (2005) offers what she calls the "Override Principle": 'if a lexical item is semantically incompatible with its syntactic context, the meaning of the lexical item conforms to the meaning of the structure in which it is embedded (Michaelis 2005: 51).' Via this principle, the boundedness of the lexical item, *apple*, is shifted from [bounded +] to [bounded -] in

association between the construction type and the lexical argument is conventional (Ziegeler 2007b: 101). On the other hand, in implicit type-shifting, which is coercion, the mismatch between the lexical item and the construction is not conventional, which calls upon the override principle.(6) and (7) are the examples.

order to conform to the requirement of the construction.

Coercion in the opposite direction is also possible as in (7). On the Construction Grammar account, a mass noun *beer* ([bounded -]) is coerced into a count noun interpretation when it occurs in an NP with an indefinite article ([bounded +]). Through coercion, *a beer* in (7) refers to a certain quantity of beer, usually a portion of some conventional size.

However, there is a shortcoming in the account above. Michaelis' Construction Grammar approach explains the coercion by using semantic features like [bounded +/-]. However, as I have shown in 1.2, semantics of a lexical item or a construction cannot be analyzed in terms of binary or clear cut semantic features like [bound -] would suggest. Theoretically, *beer* is a non-count noun. However, can we then say that beer is clearly conceptualized as [bounded -]? We mostly buy coke in a certain unit such as in a bottle, in a glass, or in a can. We can usually count beer because it is in a container. It is possible that speakers' conceptualization of coke is the one in a certain container, depending on the context where the beer is invoked. Actually, in a google search,[8] I found quite similar number of instances of "He drank a beer" and "He drank beer" (13,600 vs. 169,000 respectively). This suggests that in order to discuss the semantics of lexical items and constructions, we need to incorporate our use and experience about the concept of the words and the constructions. Therefore, semantic compatibility cannot be simply a matter of compatible vs. incompatible. In 1.4.1, I will propose how we can account for the semantics of a lexical item and a construction and their compatibility by incorporating

[8] Even though it is not the best way to discuss frequency, at least it shows a very general picture of how often it is used by speakers.

language use.

Another approach to coercion is a cognitive linguistic account based on metonymy. Kövecses and Radden (1998:58) propose that the CONTAINED FOR CONTAINER metonymy is applicable to (7). Only the contained matter (*beer*) stands for the whole concept where the beer is contained in a container. Thus, in (7), the interpretation of *a beer* is equivalent to *a glass of beer*.

The metonymy account still needs further consideration from the perspective of processing. Ziegeler (2007a) criticizes the metonymy account, observing that some metonymies are not as easily retrievable as others. Let us discuss the example (8).

(8) a. # Brad had a bread for breakfast [a slice of bread]. (Ziegeler 2007a: 1012)

b. # Hannah had a honey in her tea [a teaspoon of honey]. (Ziegeler 2007a: 1012)

(8a) and (8b) are parallel to (7) in that both bread and honey are mass nouns but occur with an indefinite article. However, Ziegeler claims that the metonymy in (8) is not as easily retrievable as the one in (7). If the metonymy is hard to retrieve, it will cause more difficulty in processing the expression associated with the metonymy. This suggests that the metonymy account of Kövecses and Radden (1998) is not sufficient to explain coercion because the difficulty in processing coerced sentences may vary depending on the difficulty of the retrievability of the metonymy.

Where does the different difficulty in metonymy retrieval come from? The usage-based model proposed by Langacker (1988), which will be discussed in more detail in 1.4, incorporates frequency and processing as important factors that affect the structure of language. Let us suppose that a lexical item is not highly compatible with a construction, so a metonymic interpretation must be retrieved for coercion. However, if the lexical item is frequently used with the construction, the collocation of the lexical item and the construction will be conventionalized and the potential for activating the metonymy increases. Then, the retrieval of the metonymy becomes easier, and the processing of the coerced expression will be easier and faster. In this way, frequency of the use and conventionalization may affect processing during coercion.

Moreover, if a collocation, which once used to be a coerced expression, is used frequently and conventionalized, we can expect that it may no longer be processed as a case of coercion any more. For example, it seems that *a beer* as in (6) is used frequently and is quite conventionalized these days as the google search shows, then, can we say that *a beer* is an instance of coercion? This question implies that coercion should be examined in relation with usage and it is not something to be examined excluding the aspects of language use.

If frequency and processing are taken into consideration, we can see that coercion cannot be easily explained only by semantic features, and the metonymy account can be better understood.

1.3.2. Complement Coercion

Another type of coercion is 'complement coercion' (Ziegeler 2007a). Here the coercion effect arises from the fact that the verb requires an event type complement whereas the complement designates a non-event entity as in (8) (Traxler, et al. 2002).

(9) John *began* the book.

Here, the verb *begin* requires an event complement such as “reading the book,” “writing the book,” etc. However, the complement designates only an entity, “book.” This mismatch triggers coercion and the interpretation of the NP is coerced into an event of ‘reading a book.’ (Traxler, et al. 2002, Pustejovsky 1995).

Pustejovsky (1995) claims that coercion of the book into the meaning of event occurs based on “qualia structure.” Qualia structure is a set of systematic properties of a lexical item which involves inherent semantic knowledge associated with some knowledge such as material, weight, shape, color, creator, and built-in function, and so on. According to Pustejovsky (1995), the qualia structure of *book* specifies its function as being read and its origin as being written by someone else. Based on the qualia structure of *book* that it is written to be read, the entity type of *book* gets interpreted as an event, reading the book.

Ziegeler (2007a:1013) views that the event is reconstructed through the metonymy OBJECT FOR AN ACTION IN WHICH THE OBJECT IS INVOLVED. In this case, the extra-linguistic knowledge (Ziegeler 2007a:1013) regarding ‘the book,’ such as ‘the book is an entity to be read or written,’ is used to reconstruct the ellipted event.

However, the studies cited above (Pustejovsky 1995, Traxler et al. 2002, Ziegeler 2007a) did not focused on the fact that the coerced interpretation can be different depending on other components in the sentence as in (10).

(10) a. The *author* began the book. [writing the book]

b. The *student* began the book. [reading the book]

For example, if the subject is *author* as in (10a), the coerced interpretation is likely to be 'writing the book' whereas if the subject is *student* as in (10b), the interpretation is likely to be 'reading the book.' In other words, there are various possible coerced interpretations and other components in the sentence affect the coerced interpretation as well. Therefore, we need to examine what linguistic components, other than the lexical item that occurs in the construction, influence coercion and how the semantics of the components affect coercion.

1.3.3. Aspectual Coercion

Aspectual coercion arises when the lexical aspectual type is incompatible with the grammatical aspectual categories (Ziegeler 2007a:994). One of the examples of aspectual coercion is the progressive of a stative verb as in (11). According to Michaelis' account (2005), a progressive construction requires an activity as a verb complement of the head auxiliary *be* as in *I am running* where *run* is a verb denoting an activity. However, in (11), a stative verb is used. In this case, coercion is involved to be interpreted as if the event of *like* is a "temporary state" (Michaelis 2005: 75).

(11) I'm liking your description. (adopted and modified from Michaelis 2005: 75)

According to Michaelis (2005: 75), the interpretation of "temporary state" is not in fact a state but a homogeneous activity. She provides the semantic representation of a stative verb such as *like* as [X <STATE>] while that of a homogeneous activity verb such as *sleep* as [X HOLD [X <STATE>]]. The operator HOLD means that the state begins and ends within a certain period. An additional argument X reflects that the subject is responsible for the maintenance of the denoted state (Michaelis 2005: 66). For example, a person can sleep for a certain period and this person is responsible for maintaining the state of sleeping. If we add the operator HOLD and another argument X to the description of *like*, i.e. [X <STATE>], we can coerce the stative verb *like* into the homogeneous activity so *like* can occur in the progressive construction. As a result, the coerced interpretation of (11) is that the subject temporarily likes the description.

Regarding Michaelis's explanation, Ziegeler (2007a) questions why we need this kind of abstract operation. As an alternative explanation, she proposes a diachronic approach. In Old English, the progressive was often used to designate situations of permanent, generic nature and a durative, temporary nature, which are the properties of stative verbs. The progressive gradually came to be used with more dynamic, perfective verb types, and in present English, we use the progressive for activities (Ziegeler 2007a). On Ziegeler's account, we do not need the concept of 'coercion' as an explanation for the resolution of the incompatibility because the progressive of a stative verb is a part of historical development.

If we focus on the origin of this linguistic phenomenon, Ziegeler's diachronic account might explain the co-occurrence of a stative verb in the progressive construction, but when we focus on what happens to the mind of speakers of the present day when this linguistic phenomenon is given, the diachronic change alone cannot explain it. Speakers in the present day do not have know the historical development of the linguistic phenomena. The question then is if they regard the stative verbs occurring in the progressive construction as incompatible. When speakers use the progressive construction, will the stative verb occurring in the construction be processed equally easily as the activity verb? Will the stative in the progressive construction be considered equally acceptable as the activity verb in present day English? If the processing and the acceptability of stative verb and the activity verb are different, it means that there is a room for coercion to occur which affects processing effort and acceptability.

As a way to investigate the status of coercion in the present day, we can exploit various empirical data such as data from processing and acceptability judgments, which reflect present day usage on the assumptions of the usage-based model (Langacker 1988), which will be discussed in 1.4.

1.3.4. Argument Structure Construction Coercion

The last type of coercion that has been noted in the literature is argument structure construction coercion. From the perspective of Construction Grammar, the conflict arises from the relationship between a verb and the thematic roles which that verb assigns (Michaelis 2005: 56) as in (12).

(12) Sam *sneezed* the napkin off the table.

As is discussed in 1.1, the verb *sneeze* itself assigns only the thematic role of a theme, the sneezer, and it is not a verb which causes another entity to move. On the other hand, the construction requires three thematic roles which are a cause (the causer), a theme (the entity that is moved), and a path (the path along which the entity is moved). This incompatibility is resolved by making the verb conform to the constructional meaning via the Override Principle introduced in 1.3.1. The meaning of caused motion is supplied by the construction: the subject *Sam* is interpreted as a causer which causes the napkin's moving, *the napkin* as a theme or object which is moved, *off the table* as the path of moving, and the verb *sneeze* as a manner of moving the napkin.

Another example is (13).

(13) Sam *squeezed* the rubber ball *inside the jar*. (Goldberg 1995:158)

Here, neither the verb *squeeze* nor the PP *inside the jar* denotes a motion and direction. However, the whole expression can mean motion directed to a certain place in the right context:[9] Sam squeezed the rubber ball so that it moved from outside to inside the jar. The meaning of the individual components conforms to the meanings of the caused-motion construction: *squeeze* is coerced into the meaning of the manner of caused motion and *inside the jar* into the meaning of the path along which the ball is moved and the final position where the ball is placed.

It has been claimed that the constructional meaning that "wins out" the lexical meaning (Micahelis 2005), according to the Override Principle. However, I claim that the meaning of a lexical item or other components that occur in the construction sometimes

---

[9] (13) can have two interpretations: one is a caused-motion as described above and the other is that the squeezing event occurs inside the jar and the rubber ball stays in the jar.

wins out the constructional meaning or at least affects the coercion, which will be shown throughout the following chapters. In this section, I will briefly discuss how the meaning of the lexical item and other components also affect coercion.

(14) She *kicked* it *under the table*. (Ziegeler 2007a: 1005)

The semantic specification of the prototypical meaning of *under the table,* outside its context, would be a location rather than a direction as in *The football is under the table*. In (14), this locative PP[10] is coerced into a directional interpretation when occurring in the caused-motion construction. Goldberg claims that "in order for coercion to be possible, there needs to be a relationship between the inherent meaning of the lexical items and the coerced interpretation" (Goldberg 1995:159). The relationship of the NP in the locative PP and the directional interpretation in (14) is that the NP in the locative PP can be construed as the end-point of the path designated by the preposition. Thus, it can be coerced into a directional interpretation.

However, I claim that the locative PP can be coerced into directional interpretation only when the PP is conceptualized with the semantics of other components in the sentence. For example, in order for coercion to occur, the semantics of a verb needs to

---

[10] Goldberg (1995: 158) notes that English prepositions are ambiguous being able to be interpreted as locative or directional. However, she claims that they are not ambiguous in all contexts. For example, in the sentence *Within the room he ran, quick as lightning*, the preposition does not receive a directional interpretation. She also says that prepositions such as *inside, in, outside*, and *within* do not intuitively code motion.

interact with the semantics of the PP. Let us compare (14) and (15) where the difference is the verbs: *kick* in (14) and *pick* in (15).

(15) She *picked up* the napkin *under the table*.

Typically, outside its context, in the event designated by the verb *kick*, the starting point is typically the 'kicker.' If the kicker causes an entity to move by kicking, the entity will move from the kicker and stop moving at some point but this end point is not implied in the verb meaning itself. If there is a locative PP as in (14), the PP is likely to be conceptualized as the end-point of the path projected by kicking action. Therefore, in the caused-motion construction, the locative PP can be coerced into the directional or path interpretation.

On the other hand, when the locative PP occurs with a verb like *pick up* as in (15), it is not coerced into a directional meaning. Outside its context, in the event designated by *pick up*, the implied end point where a moved entity arrives at is usually the person who picks up. But the starting point is not implied. If there is a locative PP as in (15), the PP is more likely to be conceptualized as the starting point of the action, not the end point. The PP *under the table* is likely to be understood as the position where the napkin was located and the event of picking up started. Therefore, in (15), we are not likely to conceptualize the PP as an endpoint to which the moved entity is directed.

The contrast between (14) and (15) shows that in order for the PP to be coerced into a directional or path interpretation, it must be considered with the verb meaning. Since the meaning of the linguistic components other than the lexical item that undergoes coercion also affect coercion, we need to investigate not only the semantic compatibility between the construction and the lexical item which is coerced but also the semantics of other linguistic components as well.

The effect of linguistic context is also pointed out by Kemmer (2005) with the example sentence '*She squinted into the room*.' The use of *squint* in the caused-motion construction does not seem to be acceptable. However, when a context involving the visual event, similar as in *She looked into the room,* is posited, *squint* can be interpreted and used with the caused-motion construction.

Also, Ziegeler (2007a:1006) suggests that plausibility in reality affects the coercion effect as a constraint. (16) shows that the semantics of a PP can influence coercion as well.

(16) Sam sneezed the napkin *on the table*. (Ziegeler 2007a:1006)

The difference between (12) and (16) is the PP, but both do not basically denote direction nor motion. However, (16) is less acceptable than (12) (Ziegeler 2007a:1006). The difference comes from the plausibility in reality. In (12), we can easily imagine a situation where Sam sneezes and the napkin is caused to be blown away from the table by being influenced by the sneeze. On the other hand, it will be hard to move the napkin and cause it to be placed on the table by sneezing.

So far, we have seen the factors that may influence coercion: the constructional meaning, the meaning of the lexical items which occurs with the construction, and extra-linguistic factors. The interaction of the semantics of these factors in the caused-motion construction suggests the need for exploring coercion in more detail.

1.3.5. Summary and Further Considerations on Coercion

There have been some views that coercion is not a special phenomenon different from other composition of linguistic components, and therefore, coercion is an unnecessary concept. For example, Ziegeler (2007a) is skeptical about using the term 'coercion' itself. She claims that 'coercion' is a redundant concept because we can account for the resolution of incompatibility between a lexical item and a construction by means of existing concepts such as pragmatic inferencing or diachronic development and grammaticalization. Also, as we will see later in 1.4, on the view of Cognitive Grammar (Langacker 1987, 1988, 2005, 2008, and 2009, among many others) on which the usage-based model is built, coercion can be viewed as semantic accommodation through schema extension, which is a general cognitive process forming the basis of semantic composition.

Nevertheless, I claim that the concept 'coercion' is important to examine because coercion is involved in the composition of linguistic units of different levels of schematicity: one is the lexical level and the other is a more schematic level. Coercion is meaningful in that it shows how linguistic units of the more specific level (i.e. lexical items) and those of the more schematic level (i.e. constructions) interact when they are composed in a hierarchic system (Traugott 2007).

In addition, when a construction (i.e. a more schematic linguistic unit) is given, the lexical item (i.e. a more specific linguistic unit) that can occur in the construction is likely to be restricted by the constructional meaning, and the lexical meaning provide more specific meaning to the meaning of the whole expression. In short, a construction gives basic form and meaning of a phrase (or a clause in the case of the argument structure construction), and the lexical item specifies the construction in terms of form and meaning.

Therefore, even if we see that the mechanism of composing linguistic units may be basically the same regardless of whether they are the composition of lexical items or the composition of a lexical item and a construction, coercion is important to investigate in that it is a phenomenon that occurs in the composition of linguistic units of different levels of schematicity.

This importance of coercion may have been noted by many researchers, so coercion has been studied from different theoretical approaches as shown in 1.3.1 - 1.3.4. The main problem of the previous studies listed above is that the studies relating coercion have used ‘coercion’ as a crucial part of their accounts without studying in depth what it is. Construction Grammar accounts (Goldberg 1995, Michaelis 2005) and formal semantic accounts (Pustejovsky 1995) attempt to formalize what semantic features of a lexical item have been changed to conform to those of the construction. Cognitive linguistics accounts exploit metonymy, as in the studies of Kövecses and Radden (1995) and Panther and Thornburg (1999). However, as I pointed out in 1.3.1- 1.3.4, coercion has more to investigate if we look deeper into it, considering various factors. The important factors to be considered are summarized as the followings.

First, in order to discuss the nature of coercion, we need to consider that semantic compatibility is not an all-or-nothing concept, but it is a gradient concept as I have shown in 1.1. Discussing the semantic compatibility between a lexical item and a construction in terms of feature semantics as shown in 1.2 cannot capture the continuous nature of compatibility, because a simple matching of the semantic feature of a lexical item and a construction will result in an all or nothing conclusion: compatible or incompatible. If we understand that semantic compatibility is a gradient concept, we can then ask if coercion, which is the resolution of the semantic incompatibility, is a binary concept of 'all or nothing,' or a gradient concept.

Second, as pointed out throughout 1.3.1 - 1.3.4, some factors other than the semantic compatibility between a construction and a lexical item that occurs in the construction can affect coercion. As we have seen in (15) and (16), linguistic contexts in the expression or extra linguistic factors such as the plausibility in reality may affect the degree of coercion. Also, depending on the linguistic context, the interpretation can be different as shown in (10). Therefore, I claim that coercion is a semantic integration of linguistic elements in the expressions and extra linguistic context.

Third, relying only on introspective analysis of a researcher on coercion is problematic because a researcher's analysis does not have to reflect many speakers' linguistic knowledge and use. The acceptability judgments on a sentence presented as an example of coercion may be and often are different across speakers. For some speakers, the sentence is not acceptable at all, and in this case, the incompatibility is not resolved at all. For some other speakers, they could accept the sentence but marginally. This suggests that they could make sense out of it, but greater coercing effort may be required. Also, if we look at the linguistic data actually used by using corpora, we may be able to see the linguistic context where incompatible linguistic units are used together in more detail. This will suggest some restrictions on coercion. We may also find interesting ways of resolving incompatiblity, such as different kinds of metonymy, and metaphors. These considerations suggest that we investigate coercion with empirical data.

Looking at coercion by incorporating empirical data of language use will provide various ways to account for the coercion effect. As I showed in 1.3, the experiments on coercion (McElree et al. 2001, Piñango et al. 1999, Piñango et al. 2006, and Traxler et al. 2005) suggests that coercion is an actual psychological effort. Also, if we consider the frequency of the co-occurrence of (presumably) incompatible linguistic elements, there may be some cases where it is not clear if it is a coerced case or not as in the case of *He drank a beer* vs. *He drank beer* (see 1.3.1). Consequently, examining coercion by using empirical data of frequency of usage, and processing effort will let us rethink about the nature of coercion: coercion is a psychological process for resolving semantic incompatibility, not just a theoretical explanation of incompatibility resolution.

Even though I will deal with the data of present usage in this study, some diachronic studies incorporating empirical data of frequency suggest that coercion is related with frequency and conventionalization over time (Israel 1996, Hilpert 2008, Traugott 2007). For example, a partitive construction (Traugott 2007), such as "*a lot of* ____," shows signs of grammaticalization from a partitive (to indicate a unit of an NP) to a degree modifier. In Middle and Early Modern English, *a lot of* was usually used with unbounded nouns as in *a lot of water*. It would have been the coerced case if *a lot of* was used with a bounded noun as in *a lot of apples*. Over time, it occurred with bound nouns as well, meaning "great quantity." The form also changed: the head of the construction is shifted from [NP1 [of NP2]] to [[NP1 of] NP2]], and even the morphological form changed to *a lotta*. Then, is *a lot of apples* still a case of coercion in present day? Even though no explicit frequency was provided, this clearly shows that coercion is closely related with conventionalization.

Also, Israel (1996) shows that the "*way*-construction" was developed over time through changing frequency of occurrence of the verbs with the construction. In 1350s, *way*-construction was mostly used with motion verbs like *go, run*, and *pass*, and gradually became productive enough to be used with verb not necessarily encoding motion, such as *sing* and *crunch* which would have been cases of coercion in 1350s. Hilpert (2008) provides diachronic frequency information on the Germanic future construction. These studies of diachronic account suggest how frequency in usage and conventionalization may affect coercion, and thus, empirical data of usage frequency will provide other ways to examine semantic compatibility and coercion.

Consequently, we cannot clearly say what coercion is only by looking at semantic compatibility by means of introspective semantic analysis of the word and the construction. In order to understand coercion better, we need to examine empirical data of language use such as processing, frequency of usage, and acceptability judgments as suggested throughout 1.3. In this study, I will examine coercion from the usage-based approach by correlating linguistic knowledge about semantic compatibility with empirical data derived from analysis of corpora and experiments of processing time and acceptability judgments.

1.4. The Usage-Based Model

As a way to study the semantic compatibility and coercion, I propose to examine empirical data, inspired by the usage-based model proposed by Langacker (1988) and developed by other researchers (Langacker 1987, 1988, Kemmer and Barlow 2000, Kemmer 2005, 2008).[11] This model relates language use directly with semantic knowledge and claims that language use is not independent of grammar. On this view, language use intimately interacts with grammar, or more specifically, the linguistic system: not only linguistic utterance is produced based on grammar but also its use contributes to forming grammar. Based on this model, this dissertation aims to provide a better understand of the nature of semantic compatibility between a lexical item and a construction and how the linguistic knowledge of semantic compatibility is related with language use. Based on the correlation, I further investigate the nature of coercion effect. I will specifically examine three kinds of phenomena that are considered as belonging to the realm of language use: acceptability judgments, frequency of usage, and language processing.

The empirical data from language use, i.e., acceptability judgments, frequency in usage, and processing, which the usage-based model links with the linguistic system, have been ignored by generative grammarians under the name of 'performance'

---

[11] Originally, the usage-based model was built on Cognitive Grammar of Langacker (1987). Even though I adopt the usage-based model proposed by Langcker (1988), there are other models that are usage based. For example, in phonology, studies such as Goldinger (1996, 1998) do not explicitly use the term 'usage-based model' but they share the same view with Langacker's model in that specific instances in usage play an important role in the language system. Goldinger argues that language users record phonetically-rich representations for almost all tokens we hear. From this view, phonemes are emergent abstractions (Katherine Crosswhite, personal communication, January, 2009).

(Chomsky 1957, 1965, Newmeyer 2003). However, the usage-based model highlights the importance of the usage in constructing the linguistic system. This model assumes that linguistic system is fundamentally grounded in instances of linguistic usage (Kemmer and Barlow 2000: viii). The interaction of the usage and the linguistic system is described in Figure 1.

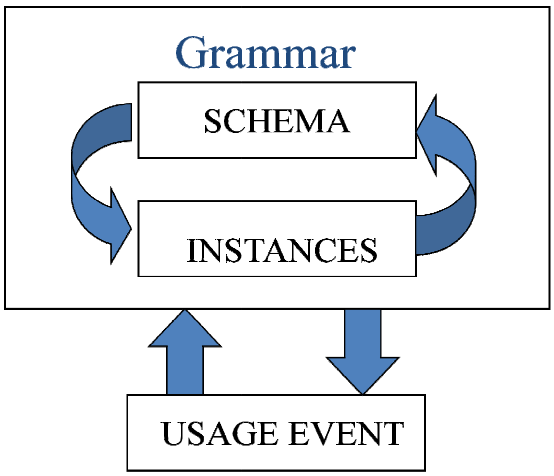

Figure 1. The interaction of the linguistic usage and grammar proposed by the usage-based model (Kemmer 2008; originally from Kemmer and Israel 1994)

Grammar here means ‘a structured inventory of conventional linguistic units’ (Langacker, 1988: 130), which includes lexicon, morpho-syntax, and phonology as well as semantics for the meaningful units. Notice in Figure 1 that both the schema and the specific instances belong to a speaker’s grammar. For example, specific instances of phonemes, morphemes, lexicons, phrases, and sentences, such as *basket*, *push, pushed*, *pushed the box into the closet*, and *I dragged the cat into the basket*, are included in the grammar. Speakers extract commonalities from the similar instances and abstract generalized patterns, called “schemas.” The schemas can be constructed on various levels of abstractness: some schemas such as [*study* + $\_\_\__{morph}$] and [V + *ed*] have a part where the phonological form is explicitly specified and a part where the form is not specified while other schemas like [N] and [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]] are more schematic than the former ones, with no parts are phonologically specified.

On the usage-based model view, the use of language is tightly linked with the linguistic system, which is expressed as the arrows between the Grammar and the Usage Event in Figure 1. When speakers hear or produce linguistic instances in a usage event, these instances collectively have an effect on the linguistic system. The instances that speakers hear and use are specific in context but if they experience similar instances repeatedly, they can generalize the instances into a pattern by extracting commonalities and construct a schema. For example, people may hear similar instances of the same pattern where directional motion verbs occur in the syntactic form [SUBJ$_i$ [V OBJ$_j$ OBL$_{dir}$]], such as *pushed the box into the closet*, and *dragged the cat into the basket.* If they hear instances similar with this pattern frequently, from the instances, they will construct the caused-motion construction schema occurring with directional motion verbs, and their co-occurrence of such verbs and the construction will be entrenched. On the other hand, it is possible that they hear the collocation of non-directional non-motion verbs such as *sneeze* and the caused motion construction, but very few times. The instances may be in their grammar, but the use of non-directional non-motion verbs with the caused-motion construction may be hard to be entrenched as a schema.

In Cognitive Grammar (Langacker 1987), on which the usage-based model is built, a schema is not a mechanism that produces “outputs” as the “rules” do in Generative Grammar. Rather, it serves as symbolic resources with which speakers exploit to construct new expressions (Langacker 1988: 132), which is represented in Figure 1 by the arrow from the schema to the instance. Schemas function as a device for categorization. The schema specifies the properties that the instances have to have in order for them to be valid members of the category. We can determine whether or not to combine two linguistic components based on how well the instance where the components occur together is categorized to the schemas of those components. For example, the instance *pushed the box into the closet* can be categorized as a member of the schema of "caused-motion construction" because the instance fits the constructional schema, which specifies a "directional motion verb." In turn, this instance can be easily categorized as the member of *push* schema because the schema of *push* specifies a construction whose meaning is caused-motion. Since this instance is readily categorized as the member of both the lexical schema and the constructional schema, we can conclude that *push* and the caused-motion construction can co-occur with no problem.

There are different kinds of categorizing relationship. One is "elaboration" or "instatiation" of a schema, represented by the sold arrows in Figure 2. A schema is elaborated by an instance that conforms to or is compatible with the specifications of the schema. The examples are above illustrated: *pushed the box into the closet* is an intantiation of the *push* schema and the caused-motion construction schema.

Another kind of categorizing relationship is "extension," represented by the dotted arrows in Figure 2. In this case, an instance is not perfectly compatible with another but they can be roughly viewed as the members of the same category. For example, *sneeze* is not an instantiation of the directional motion verbs that can occur in the caused-motion construction, but it can be viewed as one of the verbs that can occur in the construction when its meaning is "accommodated." Accommodation is Langacker (1988)'s terminology which means the adjustment in details of a component when integrated with another incompatible linguistic component.[12] When the meaning of *sneeze* is accommodated to "the means of causing a motion," it can be used as an extension of the verbs that occur with the caused-motion construction.

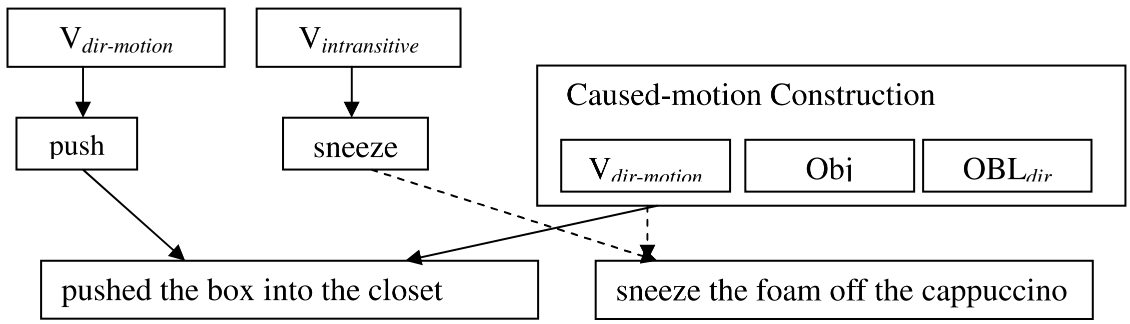

Figure 2. Categorizing relationship between schemas and instances

In this way, as Figure 1 and Figure 2 show, similar instances of usage produce a schema and new instances are produced based on the schemas.

The interaction of the instances of usage and the schemas has implications on semantic compatibility between a lexical item and a construction and frequency, processing effort, and acceptability judgments of their co-occurrence.

1.4.1. Implications for Semantic Compatibility

Earlier in 1.2, I defined the semantic compatibility as "the conceptual consistency among the prototypical semantic specifications of the components." On the view of the

---

[12] The term "coercion," which is used in Construction Grammar, can be seen as one of the accommodation processes.

usage-based model, prototypical semantics in this definition would be 'schematized semantics of typical instances' (Langacker 1988:133). Therefore, the semantic compatibility between a construction and a lexical item can be interpreted as the semantic compatibility between the schema of the lexical item and that of the construction. Consequently, by examining the semantic commonalities between the schema of a particular construction and verbs that occur in it, we can discuss which verb is more compatible with the construction and which are less.

As the schema of *push* and the schema of the caused-motion construction are semantically consistent in that the verb specify a caused-motion meaning and the construction specify a directional motion verb, *push* and the caused-motion construction are compatible. Therefore, when the components whose schemas are semantically compatible are given, the instance of their co-occurrence is readily categorized as the member of each schema, and thus, can be used together. On the other hand, when the components whose schemas are not very compatible are given, the instance of their co-occurrence is hard to categorize as the member of each schema. Therefore, they are hard to be used together.

Note that when discussing the degree of semantic compatibility, I do not claim that the lexical meaning exists independent of construction and the lexical item is inserted to the empty slot of the construction. The schemas of a lexical item and a construction are abstracted and constructed from individual instances where the lexical item is used with the construction. Therefore, throughout the discussion of the semantic compatibility in this study, there is an assumption that the schemas of a lexical item and a construction are immanent in the instances in which they are used together.

Another point to be noted is the different assumption of this study about the semantic relation between a lexical item and a construction from Construction Grammar. Construction Grammarians, such as Goldberg (1995), attribute an expression's meaning to a lexical meaning as little as possible and to a construction meaning as much as possible (Langacker 2005: 150). On Construction Grammar view, a construction has a central meaning and several related meaning, and particular kinds of verbs are assigned to each constructional meaning, and this view has been called "constructional polysemy." In this way, we can explain why a ditransitive construction can have different interpretations: when it is used with a transfer verb such as *give* (*I gave him a book*), the expression is interpreted as physical transfer, while when it is used with a creation verb such as *bake* (*I baked her a cake*), the expression means intention of transfer. The ditransitive construction has both the meaning of physical transfer and the meaning of intention of transfer, and each constructional meaning make reference to transfer verbs and creation verbs, respectively.

However, there are problems in the constructional polysemy model. First, if there is no clear distinction between a lexical item and a more schematic construction, following the definition of construction of Construction Grammar, then how can we decide when to attribute the meaning of an expression to a lexical item and when to a construction? Second, we cannot explain why there are different degrees of semantic compatibility, if verbs are assigned to different meanings of the construction. Why is *grow* less compatible with the caused-motion construction while *put* is highly compatible although each of them is assigned to a certain meaning of the construction? It might be possible to claim that the difference in semantic compatibility comes from frequency of usage that *put* is used in the caused-motion construction more often than *grow*. Then, once again, we come back to the claim of the usage-based model, which links semantic compatibility with frequency. Lastly, as we will see later in 2.3 and 5.3, we can find different processing time depending on different verbs, but constructional polysemy does not account for this varying processing effort.

Therefore, I object to the view of constructional polysemy, in which several meanings of construction licenses different kinds of lexical items. Rather, I follow the usage-based view that the schemas are immanent in the instances, and in order for a lexical item and a construction to be used together, the lexical schema and the constructional schema have common semantics which makes the lexical item and the construction compatible (e.g. *push* and the caused-motion construction), or their meanings are accommodated (e.g. *sneeze* or *grow* and the caused-motion construction).

1.4.2. Implications for Frequency in Usage

In the usage-based model, the frequency of linguistic instances is important in constructing a grammar. If a certain pattern of instances are used frequently, speakers will abstract a schema from the instances, and the schema will be cognitively entrenched. For example, if directional motion verbs such as *put* and *drag* are used with the caused-motion construction repeatedly, their co-occurrence will be more entrenched. On the other hand, the instances where intransitive verbs such as *sneeze* and *grow* are used in the caused-motion construction, their co-occurrence may not be entrenched as a schema. Nevertheless, if they are used repeatedly, it may be entrenched as a schema in the end, and *sneeze* and *grow* may be viewed as semantically compatible.

1.4.3. Implications for Processing Effort

The usage-based model also provides a prediction about processing during language use. Each linguistic unit is conceived as a node in a network, the units are structured in the linguistic system by categorizing relationship as stated above. We can posit a "distance" between nodes of linguistic units in the network, and the distance may vary depending on how much one is elaborated or extended from another. If the relationship between two units has a psychological consequence, we can predict that processing the units together requires processing effort when there is accommodation or extension. For example, the distance between *grow* and the caused-motion construction is greater than that between *push* and the construction because *grow* is less compatible with the construction, and therefore is predicted to require more processing effort.

This model assumes the frequent use of linguistic units as recurrent patterns of cognitive (and ultimately neural) activation (Kemmer and Barlow 2000: xii). The nodes of linguistic units and the categorizing relationship among them have different degrees of cognitive salience and entrenchment. If a certain linguistic pattern is experienced frequently, the mental activation pattern is routinized, and thus processing of the pattern becomes faster (Hare, McRae, and Elman 2003, MacDonald 1999). On the other hand, an unfamiliar or infrequent linguistic instance takes more time to process because the neural connection is not a routine activation pattern. Based on this assumption, we can hypothesize a relationship between the processing during language use and the speaker's linguistic knowledge of specific units (instances) and general units (schemas): if a certain pattern of instances is entrenched as a schema and when speakers speak or hear a new instance that fits the pattern of this schema, they will process this newly given instance more easily than an instance that does not fit the schema. On the other hand, an unfamiliar instance or an infrequent instance should take more time to process because we need to activate weak connection.

1.4.4. Implications for Acceptability Judgments

Lastly, we can relate speakers' judgments on acceptability of given expression with usage. Strictly speaking, acceptability does not exactly reflect language use. Rather, acceptability or grammaticality judgments have been used as an important source of evidence in constructing grammar (Schütze 1996: 1-2) or 'linguistic competence.' However, Schütze (1996), along with many other linguists, claimed that grammaticality or acceptability judgments are not a perfect way to observe linguistic competence because they involve the interaction of lots of factors (Schütze 1996: 179-180). When people judge acceptability of a certain expression, they utilize the factors that they use in normal conversation, such as the linguistic knowledge and their knowledge about world, and contextual information because they have to comprehend the given expression first in order to judge its acceptability. When they judge, it is possible that people analyze why the expression is acceptable (or not acceptable) based on the prescriptive rules that they learn in school. Also, it is possible that they may imagine a plausible situation where the expression may fit by using metalinguistic strategy (Schütze 1996: 179). As is well known, individual speakers' judgment on acceptability may be slightly different from person to person, and this is possibly because people employ the factors above mentioned in different ways.

In addition, following the usage-based model, the individual difference comes partly from individuals' different linguistic experience, even though Schütze (1996) does not consider linguistic experience as an influencing factor. People experience a certain expression in different frequency in different context, and the different usage has built different schema. This different linguistic experience will influence their linguistic system. Therefore, we can say that acceptability judgments are not only the measure that reflects an individual's linguistic system but also reflects his or her linguistic experience.

When the acceptability judgments data are collected from many native speakers, we can obtain a pattern that reflects not only the linguistic knowledge but the linguistic use of different speakers. Therefore, the acceptability judgments of more than one speaker reflect language use better than that of one researcher.[13] Therefore, I claim that acceptability judgments are related with the language use, at least indirectly.

In conclusion, linguistic system can be understood by means of a linguist's observation and introspective analysis, but according to the usage-based model, in order to understand the linguistic system better, we need to look at language use as well. We

---

[13] Newmeyer (2003), who claims that language use does not affect grammar, also admits that each individual's grammar can be different. He claims that we cannot discuss one individual's grammar by using corpus data because it is a collection of usage of many different individuals from different community. One cannot have a collective mind (Newmeyer 2003: 696). However, I claim that this, in turn, suggests that, by using corpus data, we can discuss a linguistic system generalized by or common among speakers in a community larger than a small and specific community. For the same reason, I claim that the collection of acceptability judgment data can reflect the linguistic system commonly agreed by speakers from different community.

can relate three kinds of evidence of language use in order to understand linguistic system in the following way represented in Figure 2.

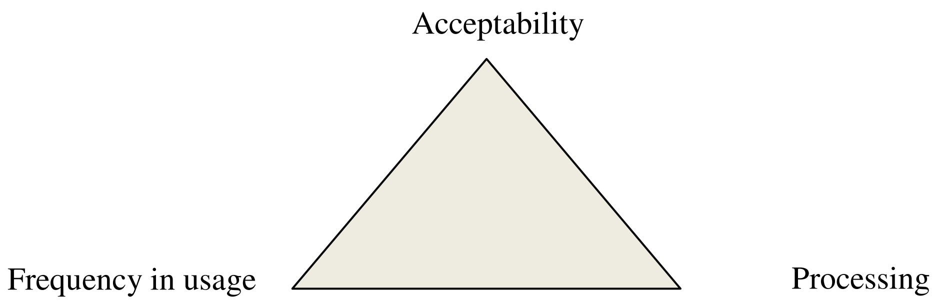

Figure 3. The correlation of language use suggested by the usage-based model

Figure 3 predicts the correlation of three kinds of evidence of language use, which interacts with the linguistic system. If a speaker's linguistic system is constructed through generalizing patterns from the use of individual instances, the patterns entrenched in the linguistic system will be judged acceptable, will be used frequently, and will be processed easily. If a pattern is used more frequently, the pattern will be entrenched as a linguistic system, will be judged more acceptable, and will be processed more easily. Also, if a pattern is processed easily, it will be used more frequently and entrenched more and more in the linguistic system, and will be judged more acceptable. In this way, acceptability judgments, frequency in usage, and processing are predicted to show correlation. By looking at these three kinds of empirical evidence, we can understand the linguistic system better.[14]

---

[14] There is a caveat when discussing the correlation between the linguistic knowledge and the empirical evidence. The usage-based model predicts general correlation, not exact and clear

Assuming that these three empirical data of language use are correlated, acceptability judgments, frequency and processing data will help us understand the knowledge about the co-occurrence of a lexical item and a construction and their semantic compatibility, and further, about the nature of coercion. We have seen, in 1.2, that the semantic compatibility is not sharply divided into 'compatible' and 'incompatible.' I predict that the empirical evidence such as acceptability judgments, frequency, and processing, which is predicted to be correlated with the semantic compatibility will all show gradient characteristics. When collocations of different degrees of semantic compatibility are given, speakers will not judge them as simply 'acceptable' or 'unacceptable.' The corpus, which I will use as a way to examine frequency, and processing time will also show different and gradient frequency depending on the semantic compatibility between a lexical item and a construction.

If the collocation of a lexical item and a construction is not perfectly compatible, we can expect greater coercion to resolve the incompatibility. If we view coercion as a psychological process for resolving incompatibility, as claimed in 1.3.5, then, we can

---

correlation, between the linguistic knowledge and the empirical evidence. The usage-based model assumes that the linguistic experience can be different from person to person, and the results from any empirical study may show discrepancy depending on the given contextual factors (such as different experimental environments, different corpus genres, etc) however hard we may control the possible factors. In other words, there might be some discrepancy between the empirical evidence of frequency, processing, and acceptability judgments at least for some test materials or individuals. However, it does not mean that not exact correlation between the linguistic analysis of semantic compatibility does not mean that the prediction of the usage-based model is wrong.

discuss the coercion effect only in terms of degree because it is predicted to involve many factors such as the semantic compatibility, context, and linguistic experience of individuals (i.e. how frequently people hear and use the collocation, how easily they process it, so how entrenched the collocation is). Therefore, the usage-based model suggests these empirical data of usage be considered for a better understanding of coercion.

1.5. Organization of the Study

In order to examine the relationship of the knowledge about semantic compatibility and language use, and further examine the coercion effect, I will examine the semantic compatibility between an argument structure construction and its co-occurring verb and coercion arising from the composition of the verb and the construction. As I stated in 1.3.5, verbs and their argument structure have been distinguished as "subcategorization frames" which hav been regarded important when constructing a clause. I expect that this type of composition will show dynamic interaction between a verb meaning and a construction meaning.

I will deal with two constructions in this study; English sentential complement construction (SCC) as in [V [*that* Sentential Complement]] (e.g. *She said that they were very impressed*) and English ditransitive construction (DC) as in [V N1 N2] (e.g. *They gave us t-shirts and stickers*).

These two constructions are different in the following ways. The SCC has rather an abstract meaning that the event in the SCC is independent of the action of the main verb. The independence of the SC can be triggered by an overt marker, which is the complementizer *that*. If *that* occurs, we can expect that a sentential complement may follow *that.* Also, the participants are an Agent and an Event. On the other hand, the DC has a more concrete meaning than the SCC: transfer of possession from an Agent to the Recipient. Here, the prototypical participants (Agent, Patient, and Recipient) are concrete entities. In addition, there is no overt word that triggers the construction except the verb.

If these two different constructions show similar correlations of the semantic compatibility with the empirical data, we can better support the assumption of the usage-based model about the close connection between the linguistic knowledge and usage. Moreover, if the correlation between the semantic compatibility and the empirical data of language use is revealed, then, coercion, which is the resolution of any incompatibility between a lexical item and a construction, can be investigated based on the empirical data of usage; frequency, acceptability judgments, and processing. For example, some co-occurrences are so compatible that little or no coercion is necessary while some are so incompatible that the conflict is very hard to be resolved. Some co-occurrences are easily coerced and some are not.

I also expect that detailed examination of individual instances of the empirical data will show that some co-occurrences may require metonymy, some may require metaphors and what kind of metonymy and metaphors are used will be different. The interpretation of coercion may differ depending on the semantic compatibility. Also, the possibility that coercion occurs will be different depending on linguistic context where the collocation occurs. Therefore, in this study, based on actual instances of corpora and experimental data, I will examine in depth how semantics of a verb and a construction is extended and integrated to resolve the incompatibility.

Chapter 2 deals with the sentential complement construction, i.e. [V [*that* SC]], and the verbs that occur in it. This chapter demonstrates correlation between the different degrees of semantic compatibility, acceptability judgments, processing effort, and frequency patterns, and their gradable nature by using multiple methodologies: semantic analysis, a web-based survey, a processing experiment, and a corpus analysis. If they are correlated, it implies that coercion, which is the resolution of semantic incompatibility, is also a gradient phenomenon involving the aspects of language use. This correlation in this chapter serves as a basis for further and detailed analysis on the semantic compatibility and coercion between the ditransitive construction and verbs, which will be dealt with in the following chapters. Note that the meanings of this construction and the verbs allowed in the construction are so abstract that it will be hard to discuss detailed interpretation of the coerced expressions. Nevertheless, we can still find some degree of coercion effect even in this abstract construction.

From Chapter 3, the ditransitive construction (DC, as in [V N1 N2]) and its co-occurring verbs are discussed. In Chapter 3, I will deal with semantic compatibility between the construction and co-occurring verbs, observing it based on researchers' intuition and literatures. To discuss the semantics of the construction and various verbs, I will mainly rely on previous literatures on the target construction (Pinker 1989, Goldberg 1995) and dictionaries. I discuss what semantic properties are important for the verb and the construction to be compatible / incompatible, and in what way the incompatibility can be resolved. I will also examine what the resolved interpretations are.

Chapter 4 also deals with the corpus analysis of the DC. I correlate the linguistic observation on semantic compatibility in Chapter 3 with frequency information obtained from corpus data. By examining the actual instances of co-occurrences, we can not only confirm the semantic compatibility analysis in Chapter 3, but also can discuss the coercion effect found in the co-occurrence unexpected by the observation in Chapter 3. In addition, I will discuss linguistic contexts which are frequently associated with the co-occurrence of the construction and particular verbs.

Chapter 5 deals with an experiment on the co-occurrence of various verbs and the DC to see the acceptability judgments and processing effort. This chapter statistically correlates all four aspects of language (semantic analysis, frequency, acceptability judgments, and processing). Based on the acceptability judgments, we can see to what extent people can coerce incompatible linguistic units. Also, different degrees of processing time will show that the coercion is a phenomenon which involves different degrees of processing cost. By examining the cases where less compatible verbs are used in the ditransitive construction, we can see the possibilities of different interpretation of the coerced meaning and the influence of linguistic contexts.

Chapter 6 discusses what the detailed observations in Chapter 2-5 suggests to the field in general. Ultimately, I aim to show the dynamic nature of semantic compatibility between a lexical item and a construction and coercion. This study will support the claim that our linguistic system is not fixed but dynamically interacts with the usage, which has been regarded as the realm of ‘performance’ by traditional linguistic theory. I will further question how we can expand the study about the resolution of the semantic incompatibility in relation with usage.

2. Correlation of Semantic Compatibility, Frequency, Acceptability Judgments, and Processing Time in Sentential Complement Construction

This chapter investigates the relationship between speakers' linguistic knowledge, frequency of linguistic usage, and processing effort during the language use, proposed by the usage-based model (Langacker, 1988; Kemmer & Barlow, 2000; Rohde, 2001; Kemmer, 2005) regarding the semantic compatibility of constructions and lexical items.

Following the usage-based model, I predict that the linguistic knowledge about the semantics of a verb and a construction are closely correlated with frequency, processing effort, and acceptability judgments of their co-occurrence. In this chapter, I test this correlation with specific empirical data of frequency, processing speed, and acceptability judgments.

First, I analyze semantics of an argument structure construction and various verbs that might occur in the construction. The verbs are categorized into different degrees of semantic compatibility with the construction. These different degrees of semantic compatibility are associated with different degrees of acceptability judgments data and processing time data, obtained from a survey and an experiment. The semantic compatibility is also correlated with frequency, obtained from a corpus analysis.

The construction that is examined in this chapter is English sentential complement construction [V + [*that* + SC]] (SCC, henceforth) as in (17) taken from *Collins Cobuild English Dictionary for Advanced Learners* (2001) (CCED_AL, henceforth).

(17) Experts believe that the coming drought will be extensive. (CCED_AL)

In (17), the main verb, *believe*, takes a sentential complement, which is preceded by the complementizer *that*. Note that I restricted the instances of the SCC studied in this chapter as the instances where there is a complementizer, *that*, directly following the main verb. I did not included the instances where there is an object following the main verb like *I told him that I was sorry* or the instances where there is no complementizer *that* like *I said I was sorry* and *I asked whether he would come or not*.

2.1. Semantic Analysis on Compatibility between the SCC and a verb

This section investigates speakers' linguistic knowledge about the semantic compatibility between the SCC and various verbs that might occur in it, and posits the various verbs in different degrees of semantic compatibility. In order to examine the semantics of the SCC and which verbs are more semantically more compatible and which are less, I relied on dictionaries, the linguistic intuitions of some native speakers of English,[15] and other researchers' analyses.[16]

---

[15] I acknowledge the native speakers' consultation to my colleagues, Michael Colley, Linda Lanz, Michelle Morrison, and Cassandra Pace, and the faculty members, Amy Franklin and Suzanne Kemmer.

[16] According to the usage-based model, the linguistic knowledge and the usage are tightly interconnected. On this view, we are subject to the influence of the usage in some ways when we discuss the linguistic knowledge because our understanding of a language comes from usage. Even though we try to be independent of the usage, I admit that the influence of the usage is still involved, because the linguists and the authors of the dictionaries are not free from the influence

2.1.1. Semantics of the Sentential Complement Construction

In Construction Grammar, as stated in 1.2, a construction is defined as a conventionalized pairing of form and meaning. In other words, the syntactic form and the semantics of a construction are interrelated in that the syntactic form of the construction is directly linked to semantic information in the construction. Therefore, the syntactic form of the construction reflects the semantics of the construction.

Syntactically, the constituent [*that* + SC] is independent of the main verb [V] because it has its own subject, tense, aspect, mood, and argument structure. Let us examine example (18).

---

of the frequency in usage, which we will see in 5.3. Nevertheless, I claim that it is not always the case that the native speakers' intuition and the researchers' observation about the semantics are influenced by the frequency alone (Suzanne Kemmer, personal communication, November, 2008). For example, because the prototypical meaning of *see* is considered to be related with 'visual perception', if a native speaker of English is asked what the meaning of the verb *see* is, they would answer that it is a verb of visual perception. Moreover, it is categorized as a perception verb (Wierzbicka, 1996). However, from the corpus analysis of a part of BNC, out of 500 instances of *see*, about 60% instances were related with cognition such as 'to know' or 'to understand' while 35% were related with perception (Yoon, 2006). This shows that speakers' intuitions about semantics are not exclusively based on frequency. Also, in order to make semantic analysis as independent as possible from frequency and processing, I did not directly refer to corpus and its frequency pattern or any studies on experimental data.

(18) **I** *know* that **you** *led* a rifle platoon during the Second World War. (CCED_AL)

In (18), the main verb *know* has *I* as its subject and its tense is present. The subordinate verb *led* has *you* as its subject and the tense is past. The possible divergence of the syntactic properties in the complement from those of the main clause clearly shows the syntactic independence of the complement.

This syntactic independence of the SC reflects the semantic independence of the construction. The SCC introduces an event that occurs independently of the action denoted by the main verb. Semantically, the event denoted by the constituent [*that* + SC] can have a different Agent from the main clause. For example, in (18), the Agent in the subordinate clause (*you*) is different from the main verb Agent (*I*). Also, the action of the Agent (*led*) is not influenced by the action indicated by the main verb (*know*). Moreover, the temporal relation between the complement event and the main verb event is independent. The event in the SC can be an event occurring simultaneously with the main event, it could have happened before the main event happened, or it will happen in the future. In (18), the event in the SC (*you led a rifle platoon*) had happened before the main verb event (*know*). These semantic properties show that the complement event is independent of the main verb event in the case of SCC.

Both the syntax and semantics of the constituent [*that* + SC], therefore, indicate that the complement denotes an event independent of the main verb action. This means that if the complement is used with a main verb in the SCC, the event in the complement should remain independent of the event denoted by the main verb. Consequently, the semantic compatibility of the main verb with the SCC relates to the degree to which the complement event is independent of the main verb event.

2.1.2. Criteria of Semantic Compatibility

In 1.2, I defined the semantic compatibility between a lexical item and a construction as "conceptual consistency between the prototypical semantic specifications of a lexical item and a construction." In order to judge how compatible a verb is with the SCC when it occurs in construction as a main verb, I examined the semantics of the prototypical meaning of the SCC and the prototypical meaning of various verbs. Then, I judged how much consistency there is between the constructional meaning and the verbal meaning: in the case of the SCC, I examined how much independence the verb allows for the complement event when it occurs as the main verb of the SCC.

To determine the degree of independence, I employed the criteria of the degree of "binding" between the main verb event and the complement event from the Binding Hierarchy proposed by Givón (1980).

The Binding Hierarchy, originally constructed on the basis of cross-linguistic research (Givón, 1980), is designed to explain the relationship between the semantics of a complement-taking verb (i.e. a main verb) and the syntactic coding of complements of that verb. "Binding" is defined as "the extent to which the [main verb event] and lower clause events are coded and conceptualized as a single, integrated event" (Broccias & Hollmann, 2007). In this definition, "coding" indicates syntactic properties and "conceptualization" indicates semantic properties. In other words, there are both syntactic and semantic dimensions in binding. The correlation between the syntactic properties and the semantic properties is motivated by the iconicity of form and meaning. That is, the more a verb and its complement are conceptualized as a single, integrated event, the less would its complement tend to be syntactically coded as an independent clause (Givón 1980, p. 337). That the main verb event and the complement event are coded and conceptualized as integrated (i.e. bound) means that the complement verbs are not syntactically and semantically independent of the main verb. "Binding," therefore, refers to "semantic and syntactic dependence." I will use the term "independence" in preference to "not binding" since it seems more straightforward and less metaphorical.

According to the binding hierarchy, formal characteristics of independent complement clauses are that the case markings of subjects/Agents/topics and the tense-aspect-modality markings are independent of those characteristics of the main verb (Givón, 1980, p. 338).[17] These syntactic characteristics fit the syntactic properties of the complement [*that* + SC] described in 2.1.

As the syntactic criteria for deciding the independence of complement clauses proposed by the binding hierarchy support the syntactic independence of the complement [*that* + SC], the semantic criteria of independence proposed by the binding hierarchy can be used to decide semantic independence of the complement [*that* + SC] from the main verb. As stated earlier in 2.1.1, the degree of semantic compatibility of the main verb [V]

---

[17] The Binding hierarchy is not designed to predict the exact syntactic coding pattern of a complement in a language from the semantics of the complement-taking verb. We cannot predict that a particular verb in any given language takes a particular complement pattern. Rather, the binding hierarchy makes an implicational prediction about a universal tendency that if a certain verb is syntactically coded in a particular pattern, a verb which is less bound with the main verb in terms of semantics than this verb cannot take tighter syntactic coding.

with the construction SCC is judged by the degree of semantic independence of the complement. Therefore, for the criteria of the degree of semantic compatibility, I adopt Givón's criteria for determining the degree of independence.

The criteria for semantic independence in the binding hierarchy are "influence of the Agent of the main verb on the Agent of the complement verb," "independence of the complement Agent," and "successful occurrence of the event of the complement" (Givón,1980, p. 335). In this paper, instead of the criterion "independence of the complement Agent," I will use "autonomy of the complement Agent" by adopting the term 'autonomy' (Kemmer and Verhagen 1994), which indicates the capability of the complement Agent to act on his/her own.[18] To these criteria, I add one more criterion, which is "the intention of the main verb Agent to affect the complement event."

Note that these four criteria are so interrelated with one another that we cannot separate one of them from the others and judge semantic independence only by that criterion. For example, if the influence of main verb Agent (MA) is strong, the complement Agent (CA) is likely to have less autonomy in carrying out the action, and the caused action is thus more likely to be carried out by the CA. In addition, though Givón did not mention this explicitly, the intention of the MA is also implied in the criteria above. If the influence of the MA is strong, the MA's intention to cause the CA to carry out an action is likely to be strong. Likewise, if the event in the complement

[18] Givón (1980) originally uses the term "independence." However, it may cause confusion with my use of independence in this study, which has more general meaning, as in syntactic and semantic independence. Thus, for the criteria of semantic independence, I use "autonomy" (Kemmer & Verhagen, 1994).

actually happened, we can expect that the MA's intention to cause the CA to carry out the action is strong, the MA's influence on the CA is strong, and the CA is likely to act less autonomously of the MA.

According to the binding hierarchy, a verb whose complement is more independent tends to have the following properties: the intention of the MA to affect the complement event is weaker, the influence exerted over the CA by the MA is weaker, the CA is more capable of acting autonomously, and the intended manipulation is less likely to succeed. These semantic properties are what define a verb as more semantically compatible with the SCC.

2.1.3. Verbs of Different Semantic Compatibility with the SCC

To discuss the degree of semantic compatibility between the verb and the SCC, I selected various verbs and compared the degrees of independence of the complement event when the verbs are used in the SCC, based on the criteria above. The selected verbs show different semantic compatibility with the SCC from the least compatible to the most compatible.

2.1.3.1. Verbs involving no independent event

First, we can see that verbs like *hit, throw*, and *break* do not evoke an independent event. A verb like *hit* does not have any event besides hitting as part of its conceptualization. The event of hitting someone is so tightly integrated with the event of being hit that they are conceptualized as a single event of "hitting." Thus, such verbs are not compatible with the SCC,[19] because the semantics and syntax linked with the SC is an event that is syntactically and semantically independent of the main verb.

2.1.3.2. Manipulative-implicative verbs

If a verb evokes the meaning of manipulation and the execution of the event in the complement is implied, in this study, it is termed a "manipulative-implicative verb." When more than two events are combined, manipulative-implicative verbs, such as verbs like *make* and *have,* occur with the least independent complement. The influence of the MA on the CA is strong, and the event of the complement intended by the MA is successfully performed. Therefore, the event in the complement is not independent of these manipulative-implicative main verbs, and thus, verbs like *make* and *have* are not

---

[19] If these verbs like *hit, throw*, and *break* which do not involve any independent events are used with the SCC, the result will look "ungrammatical" (e.g. *John broke that Jane did it*). However, I include these verbs in this study for two reasons. First, grammaticality judgments are typically not very clear-cut so there is variability among the grammaticality judgment of the native speakers. For example, *John broke that Jane did it* may be interpreted as 'John broke the news that Jane did it.' Actually, as we will see later in 2.3.4, some participants still judged sentences like *John made that he did it* which looks quite "ungrammatical" as natural by interpreting them as 'John pretended that he did it.' Second, "grammaticality" in terms of syntax may have been derived from the semantic compatibility, because in the usage-based model and Construction Grammar, syntax and semantics are interrelated. This should be explored further. If we exclude the verbs like *hit, throw*, and *break* from the beginning based on the "grammaticality," we will lose the information about various interpretations and semantic compatibility of these verbs.

very compatible with the SCC.

The syntactic coding of the complement of *make* shows that the complement is far from an independent clause as seen in (19).

(19) John made *him* **work** in the evening.

For the manipulative-implicative verbs, the CA is coded as an object of the main verb and the verb in the complement clause takes a bare infinitive, and thus it carries no independent tense, aspect, and mood. This is indicative of a minimally independent event.

2.1.3.3. Strong attempt verbs

Next, we consider verbs such as *tell* and *order.* They are categorized as "strong attempt" verbs (Givón, 1980, p. 369). The complements of these verbs are more independent than the complements of manipulative-implicative verbs because although the Agent of *tell* and *order* strongly attempts to manipulate the CA, the influence of the MA is weaker than the case with manipulative-implicative verbs, and thus the event in the complement is less likely to be successfully performed than the case with *make* and *have*.

For these verbs, the verb in the complement is often coded as a *to*-infinitive where independent tense, aspect, and mood are not allowed as in (20).

(20) a. Williams ordered him *to leave*. (CCELD[20])

b. A passer-by told the driver *to move his car*. (CCELD)

Due to the greater independence of the complement event, the strong attempt verbs are predicted to be more compatible with the SCC than the manipulative-implicative verbs, even though they are not highly compatible.

2.1.3.4. Cognition-speech verbs

The binding hierarchy also deals with verbs related with cognition and utterance. Unlike verbs such as *make* and *order*, cognition-speech verbs are not related with the Agent's attempt to influence the event denoted in the complement by operating physically or socially on the CA. Rather, these verbs relate to the Agent's assessment or report of the event in the complement. These verbs are termed "cognition-speech verbs" in this study. Verbs such as *think*, *know* and *say* are examples of the cognition-speech verbs. The Agent of these verbs cognitively distances himself from the event in the complement (Langacker, 1987, p. 447) and observes or assesses the event in the complement without affecting the event. Therefore, the complement event remains independent of the main verb, and thus, the cognition-speech verbs are highly compatible with the SCC.

2.1.3.5. Weak attempt verbs

In addition to the verbs involving no independent verbs that I introduced in 2.1.3.1

---

[20] *Collins Cobuild English Language Dictionary* (Sinclair et. al. 1987) (CCELD, henceforth)

and the manipulative-implicative verbs, strong attempt verbs, and cognition-speech verbs, discussed by Givón, I expand the discussion by adding three more categories which have different degrees of independence. The added categories in the current study are "weak attempt verbs" such as *teach*, "intention verbs" such as *mean,* and "perception-emotion verbs" such as *see.* These, as I will show below, are semantically intermediate to strong attempt verbs and cognition-speech verbs in terms of independence.

First, verbs like *teach* have a more independent complement and thus are more compatible with [V + [*that* + SC]] than strong attempt verbs like *order*. Strictly speaking, *teach* is not a verb of manipulation, unlike manipulative-implicative verbs (*make*) and strong attempt verbs (*order*). In the verbs of manipulation, the MA causes another person to carry out an action and some degree of resistance by the CA is implied. However, with *teach*, the MA does not cause the CA to carry out an action and there is no implication of resistance by the CA. However, *teach* can still be analyzed in terms of manipulation. Let us examine the semantics of *teach* in (21).

(21) He taught Julie *to read*. (CCED)

In (21), though the MA (*he*) does not actually cause the CA (*Julie*) to carry out an action (*read*), he still influences her by enabling her to read. The event in the complement is less likely to be successfully performed than the case of *order* and *tell,* because Julie may or may not read. Instead, Julie has more autonomy to read whenever she wants because she was taught how to read. In addition, the attempt or intention to make Julie read is weaker than the case of *order*. Therefore, I call *teach* a "weak attempt" verb.

On the other hand, *teach* has properties of cognition-speech verbs in that it can convey information in the form of a factual proposition as shown in (22).

(22) She taught the students that George Washington was the first president of the US.

In (22), *teach* can introduce a more independent complement clause (i.e. a sentential complement) than (21). The semantics also shows more independence. The Agent of *teach* does not attempt to cause the CA to carry out an action denoted by the complement. Instead, the Agent of the main verb merely conveys the fact about the history. The verb *teach* in this case is close to a cognition-speech verb in that the MA does not affect the complement event but reports the event. Thus, the complement event is more independent of *teach* than *tell* and *order*. Even in this meaning, the teacher still influences the students by providing information, and so the complement of *teach* is less independent than that of *think*. Therefore, *teach* is more compatible with the SCC than *tell* and *order* but less compatible than *think*.

I also claim that verbs like *recommend* belong to weak attempt verbs as well. The Agent expects little resistance of the interlocutor because he/she thinks that the interlocutor is in need of the recommendation.

(23) We recommend reporting the incident to the police.

In (23), the interlocutor has more autonomy of whether or not to report the incident to the police than the case when he is ordered. Therefore, the event in the complement is less likely to be performed and the MA influences on the complement event less strongly.

2.1.3.6. Intention verbs

Another type of verbs, such as *mean* and *intend*, are termed 'intention' verbs. When *mean* is used with a human subject,[21] it denotes the intention of the MA to influence another person. However, unlike the verbs like *make, order,* and *teach*, the attempt to influence another person of *mean* is mental rather than interpersonal. In other words, the MA has an intention to manipulate another person, but this intention occurs in his mind and this intention may or may not be conveyed to the CA. In this case, the event intended by the MA may or may not be performed.

(24) The woman *meant* (for) the man to leave.

In (24), the woman had the intention to make the man leave and she may have done something to make the man leave. She may have directly told him to leave or indirectly made all conditions so that he may leave. However, in any case, since *mean* denotes the attempt occurring mentally, the man may or may not know that he was manipulated. So he may have left or not. In other words, compared with the weak attempt verbs like *teach* in (21), the CA is not strongly influenced by the MA, the CA has more autonomy, and the

---

[21] When *mean* is used with a non-human subject like *it*, *that* and *the fact*, it denotes "refer to" rather than designating the "intention" of the non-human subjects. For this study, I focused on the cases of *mean* where a human subject is used.

event in the complement is much less likely to be successfully performed by the CA (or probably not performed at all). The complement event is more independent of the main verb event, and thus more compatible with the SCC.

2.1.3.7. Perception-emotion verbs

Finally, perception verbs like *see* can be used as cognition verbs metaphorically. For example, as in (25), the verb *see* sometimes means “know” or “understand” via the conceptual metaphor UNDERSTANDING IS SEEING (Lakoff & Johnson, 1980).

(25) a. Jean saw *Ted sleeping on the bench*.

b. Jean saw that Ted was sleeping on the bench.

The difference between (25a) and (25b) is whether or not Jean actually perceived Ted in the act of sleeping. In (25a), Jean visually perceived both Ted and the event that he was sleeping on the bench, and thus knew the fact that Ted was sleeping on the bench. In this case, the primary meaning of *see* is perception, and cognition is a secondary meaning. On the other hand, in (25b), the fact that Jean knows that Ted was sleeping on the bench is primary and whether or not Jean visually perceived Ted is secondary. Therefore, the primary meaning of *see*, when occurring in the SCC, is cognition and the perception is a secondary meaning (Langacker, 1987, p. 440).

Though the perception verbs like *see* can be interpreted as cognition verbs by metaphorical extension, when no contextual information is given, the basic meaning of the verb on its own is considered to be ‘perception.’ Thus, I hypothesize that the perception verbs would be less compatible with the SCC than *think*.

In addition, I claim that emotion verbs such as *like* and *hate* also show the second most compatibility with the SCC. The object of emotion verbs is usually an entity as in *I like spaghetti* or *I hate the song*, while the object of cognition verbs is more likely to be an independent event rather than an entity. It seems that the emotion verbs are not likely to allow an independent event. However, it does not mean that they are as incompatible as the verbs such as *hit* because it is possible that a person likes an event rather than an entity as in (26a). Also, it is possible that a person likes something due to certain aspects of it. Those aspects can be expressed in the SC as in (26b).

(26) a. I just didn't like being in crowds.

b. I like the idea that we buy a house next year.

Since emotion verbs can involve an independent event as in (26), we determine that they are more compatible than the verbs with no independent event.

The actions denoted by the emotion verbs do not affect the world outside. Therefore, it is closer to the cognition verbs in compatibility than the intention verbs. Consequently, I claim that emotion verbs are less compatible with the SCC than the cognition-speech verbs but more compatible than the intention verbs.

2.1.4. Summary

In conclusion, the compatibility of a verb with the SCC can be understood in terms of the degree that the complement event is independent of the main verb event. For the criteria of independence, I adopted Givón's criteria of binding and expanded them to four criteria; i.e. the intention of the MA to affect the complement event, the influence of the MA to the CA, autonomy of the CA, and success of the complement clause event. Verbs which do not involve any separate event such as *hit* and *throw* is the least compatible with the SCC. If verbs involve a separate event and the event in the complement is not independent of the event in the main verb, these verbs are not very compatible with the SCC. By using the criteria of independence as the criteria for compatibility, the verbs that are the least compatible with the SCC are the verbs with no independent event, the next are manipulative-implicative verbs, strong attempt verbs, weak attempt verbs, intention verbs, and perception-emotion verbs, and finally cognition-speech verbs are the most compatible. Figure 4 below summarizes the degree of binding or independence and the semantic compatibility between the verb and the SCC.

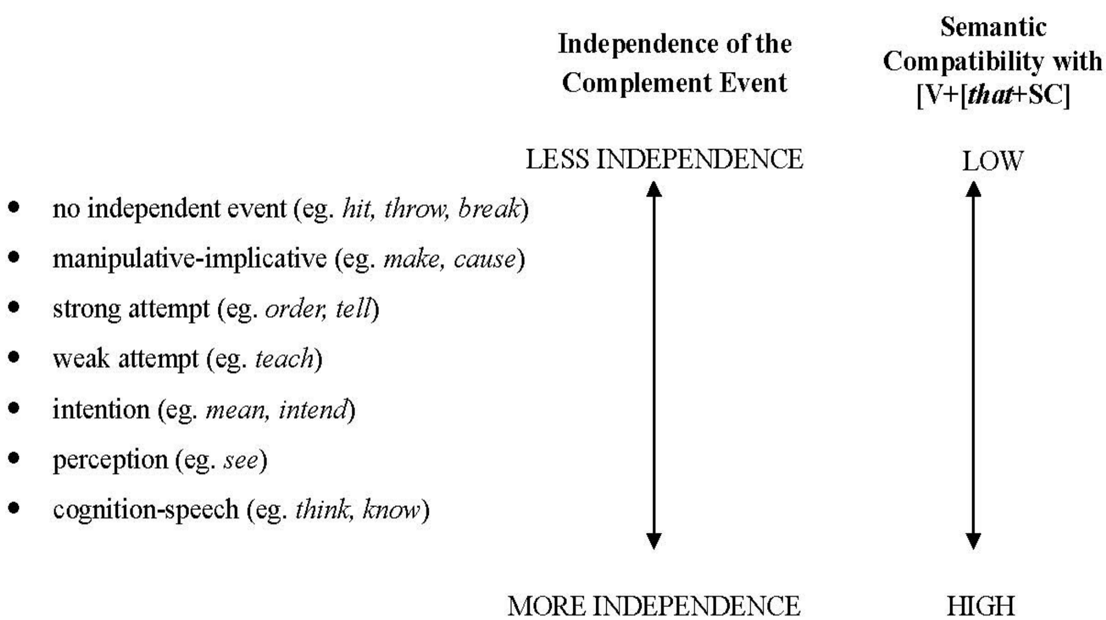

Figure 4. Semantic Compatibility with the SCC

I claim that the degree of semantic compatibility presented in Figure 4 represents speakers' linguistic knowledge about the semantic compatibility between a verb and the SCC. In the next section, this claim will be tested by examining how speakers judge the acceptability of the sentences where this construction occurs with verbs of different semantic compatibility.

2.2. Web-Based Survey

The web-based survey aims to examine whether the semantic compatibility analyzed from the linguistic point of view is correlated with the acceptability judgments of the language users. Another aim of the survey is to select verbs among which the difference of semantic compatibility is maximized for the subsequent processing experiment.

I regard acceptability judgments as one of the factors with which we can examine language use along with processing and frequency pattern. As stated in 1.4.4, it is true that acceptability judgments have been used to examine linguistic knowledge (Schütze 1996: 1-2). Therefore, linguistic knowledge about semantic compatibility between a verb and the SCC is the factor that will be the most relevant with the judgments. However, as I stated in 1.4.4, this linguistic knowledge of a person is influenced by individual language use that they experience in daily lives. Therefore, I claim that acceptability judgments are related with language use.

In order to emphasize the aim of the web-based survey and the experiment which will be discussed in the next section, I deliberately avoided using the term 'grammaticality' or 'acceptability' for the judgments because these words may make the participants judge the sentences based on the prescriptive grammar (Cowart, 1997) and may lead to rather dichotomous result (either grammatical/acceptable or ungrammatical/unacceptable). Accordingly, the instruction about the judgments was usage oriented (Schütze, 1996). For the judgment, they were asked to judge 'how *natural* the sentence that they read was *for a native speaker of English to say*.' Thus, throughout the rest of this study, I will use "naturalness judgment" to indicate acceptability judgment. The scores from the judgment were labeled as "Naturalness Score."

The web-based survey was composed of two parts. The first was a 'rating survey.' The participants were asked to rate the sentences based on how natural the sentences sound to them. The prediction is that if a verb is semantically compatible with the SCC, they will rate the sentence as natural. On the other hand, if a verb is not compatible with the construction, the sentence will sound unnatural.

The second part was a 'ranking survey' where the participants rank given sentences in the order of naturalness. The aim of the ranking survey is to support the naturalness resulted from the rating survey more clearly. It is possible that the rating scale is applied differently depending on the sentences and the participants. For example, it is possible that a participant rates *mean* and *teach* equally 3 in the rating survey even though they feel subtle difference in naturalness. Also, some people may be too generous to rate a sentence as 1 even if the sentence sounds somewhat natural while others are so conservative that they rarely rate any sentence as 1. However, when they have to decide which of the sentences is more natural by ranking them, the slight difference in naturalness among the sentences can be captured, and the rankings can compensate for the individual difference of the rating scale.

2.2.1. Survey Design

2.2.1.1. Participants and materials

Forty three native speakers of English participated in the survey. They were collected through the compensation for the course credits or through the emails to the acquaintances. Thirty seven people were at the age of 18 to 25 and the remaining six people were older than 26.

Based on the semantic analysis of the compatibility in 2.1, I selected the twenty two verbs which are expected to have various degrees of semantic compatibility with the SCC. The verbs that are the most semantically compatible with the SCC are predicted to be judged the most natural if they occur in the construction while the verbs that are the least compatible with the SCC are predicted to be judged the least natural. I predicted the naturalness score of each verb from 1 (perfectly natural) to 7 (completely unnatural), which correspond to the most compatible to the least compatible, respectively, according to the semantic criteria in 2.1.2. Table 1 presents the verbs and the expected naturalness score. Since the "predicted score" is rated based on the semantic compatibility, it can be interpreted as "compatibility score."

Verbs	Predicted Naturalness Score
think, know, remember, say, learn (Cognition-speech V)	1 – Perfectly natural. I can say it naturally.
see, like, hate (Perception-emotion V)	2
mean, pretend (Intention V)	3

teach, instruct (Weak attempt V)	4 – I can't decide. It is natural in a way and unnatural in another way.
advise, order, tell, want (Strong attempt V)	5
make, cause, help (Manipulative-implicative V)	6
break. throw. hit (No independent event)	7 – Completely unnatural. I would not say it in any circumstances

Table 1. Twenty two selected verbs and their predicted naturalness score

The 22 verbs in Table 1 were used twice with the SCC in different sentences. Therefore, there were 44 stimuli sentences. The following sentences are the examples of target sentences used in the survey. (For the complete list of the stimuli sentences used in the survey, see Appendix 1.)

(27) a. John *thought* that Jill went to the Japanese Restaurant three times a week.

b. Billy *hit* that his father drank a glass of wine every evening.

The target sentences were constructed to eliminate the effects coming from other factors than the verb's different semantic compatibility. First, as in (27a), there is no direct object noun following the main verb. If there is a direct object noun between the main verb and *that* as in [V NP [*that* SC]], I regard this construction as different one from the SCC we investigate in this study. Since having a direct object implies that the main verb influences on the direct object in some degree, this construction has different meaning from the SCC. Therefore, I did not consider the case where a direct object follows the main verb.

Second, verbs like *think, see*, and *mean* can be used as a discourse marker

(Thompson and Mulac 1991, Fox Tree and Schrock 2002) when they are used in the present tense without the complementizer *that* as in *I think his opinion is wrong*. To rule out the cases where the main verb is used as a discourse marker, which might affect the result of the survey and experiment, the complementizer *that* always follows the main verb, the tense of the main verb was fixed as past, and the subject of the main clause was a human subject of third person.

Third, in order to eliminate any possibility of the tense disagreement, the verb form in the SC is also fixed as past tense.

Finally, since I will select some sentences from the stimuli sentences of the survey for the processing time experiment, I controlled the length of some linguistic units. First, the subject of the SC was a third person with one syllable because I measured the RT for the subject of the SC, which is the word following *that*.[22] Second, the length of the sentences was standardized to seventeen syllables.[23]

The 44 sentences were divided into two blocks, each of which contains 22 different verbs. The 22 sentences within each block were randomly ordered.

2.2.1.2. Method

The participants were given URL to access to the survey. The URL had two different versions and the only differences were the order of presentation of the two blocks and the order of presentation of the 22 sentences within each block. They are allowed to select either of the versions. In the end, twenty two people selected Version A

[22] Measuring processing time will be discussed in more detail in 2.3.

[23] The average number of words in the target sentences was 11.5.

and twenty one people selected Version B.

The survey was composed of two parts. In the “rating” survey, I asked them to read sentences and rate them based on how natural the sentence sounds to them. They were explained what a “natural sentence” means with example sentences which are unrelated with the survey. In order to give them variable choices, the seven-point scale was provided: 1 as ‘Perfectly natural. I can say it naturally,’ 4 as ‘I can't decide! It is natural in a way and unnatural in another way,’ 7 as ‘Completely unnatural. I will not say it in any circumstances.’ For sentences that fall somewhere between the extremes and the middle point, they were asked to use the number which they think the most appropriate.

A “ranking survey” followed the rating survey. After they rated the 44 sentences, they were presented seven sentences picked from the 44 sentences. These sentences are predicted to be different in terms of naturalness or compatibility score (cf. Table 1). The participants were asked to rank the sentences based on the naturalness (1 as the most natural and 7 as unnatural). If they feel that some of the sentences are equally natural or unnatural, they can choose multiple sentences for the same ranking. For example, if they feel that *John taught that Jane…* and *Bill ordered that Kim…* are equally third most natural, they can rank both sentences at the position of 3.

2.2.2. Prediction

I expect that the naturalness scores will not be dichotomous as 1 and 7; rather, the scores will be gradable throughout the verbs as presented in Table 1 so. Because some lexical items are compatible with a construction and some are not while other verbs are in the middle as we saw in 2.1.3, when the verbs with different degrees of compatibility are used with the construction, the participants will give the sentences different degrees of naturalness scores. Therefore, I expect that the naturalness scores will be gradual from 1 to 7, being roughly similar with the predicted scores in Table 1.

As for the ranking survey, I predict that participants will rank the sentence containing a verb of the most compatible with the SCC at the highest (i.e. the most natural) rank and rank the other sentences in the order of the semantic compatibility, predicted in Table 1.

2.2.3. Result

The naturalness scores of each verb in two versions and their average scores are presented with their predicted scores in Table 2. The verbs are ordered according to the average naturalness scores resulted from the survey.

Verb	Version A	Version B	Average_AB	PredictedScore
think	1.12	1.14	1.13	1
learn	1.57	1.18	1.38	1
know	1.45	1.57	1.51	1
remember	1.95	1.18	1.57	1
say	1.9	1.39	1.65	1
hate	1.79	1.59	1.69	2
like	1.74	1.73	1.74	2
pretend	1.88	1.59	1.74	3
see	2.29	1.57	1.93	2
mean	2.48	1.73	2.11	3
teach	4.64	3.98	4.31	4
advise	5.19	4.2	4.70	5
instruct	5.55	4.66	5.11	4
order	5.33	5.16	5.25	5
tell	5.62	5.16	5.39	5
want	6.31	5.66	5.99	5
help	6.48	6.25	6.37	6
throw	6.83	5.95	6.39	7
break	6.67	6.14	6.41	7

make	6.6	6.25	6.43	6
cause	6.74	6.52	6.63	6
hit	6.83	6.61	6.72	7

Table 2. Results of the web-based survey on naturalness scores

The result in Table 2 is plotted in Figure 5. Figure 5 shows which verbs were judged more natural and which verbs less natural as a result of the survey. The "survey results" are the mean scores across the participants and the versions and are marked with a dark solid line. The "predicted scores" are the score predicted based on the semantic compatibility in Table 1 and are marked with a grey dashed line. The verbs are ordered according to the survey result scores. Note that 1 is the most natural and 7 is the least.

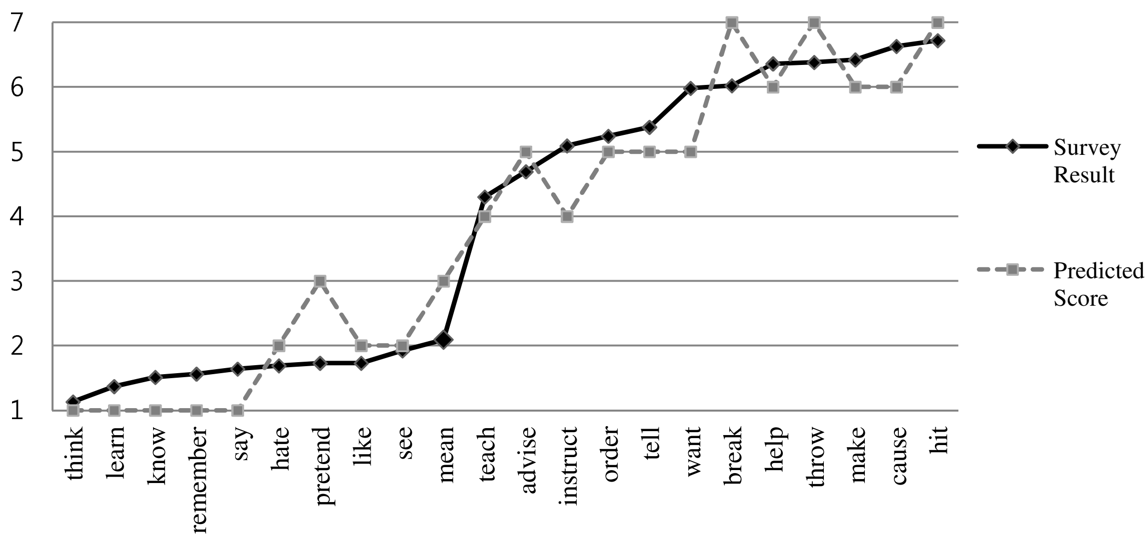

Figure 5. Naturalness score across 22 verbs

As we can see in Figure 5, the verbs that were judged the most natural were *think, learn*, *know*, *remember*, and *say*, which are the cognition-speech verbs. On the other hand, the verbs that were judged the least natural were *help, make*, and *cause*, which are the manipulative-implicative verbs and *throw* and *hit*, which are the verbs with no independent event. The scores rated by the participants are not exactly equal to the predicted scores but the two show a roughly similar trend ($r^2 = .92$, $p < .001$) as we can see in Figure 5. In addition, the survey scores show a gradual change across the verbs rather than dichotomous as shown in Figure 5 even though there is a big leap between the verb *mean* (2.09) and *teach* (4.30). Therefore, I conclude that the survey result fairly follows the prediction: the verbs which are semantically more compatible with the SCC are judged more natural to occur with the SCC whereas the verbs which are less compatible are judged less natural.

Even though the naturalness scores of the 22 verbs show gradual change, we can say that at least some of the verbs show significantly different naturalness scores from one other. For example, it seems clear that *think* and *hit* are quite different in terms of the naturalness score. In order to examine which verbs show statistically different naturalness scores from one another, I conducted a *post-hoc* test (Ryan-Einot-Gabriel-Welsch) on the 22 verbs.

The result was that *think* (cognition-speech verb), *mean* (intention verb), *teach* (weak attempt verb), *tell* (strong attempt verb), and *help* (manipulative-implicative verb) are all statistically different from one another, supporting that the verbs in different semantic compatibility category are truly judged different in terms of naturalness by native speakers. All other verbs were not significantly different from one another being posited on the continuum of the naturalness.

Next, Table 3 shows the results from the ranking survey.

	1 Perfectly Natural	2	3	4	5	6	7 Completely Unnatural
know	**22**	11	3	6	0	1	0
like	16	**17**	8	2	0	0	0
mean	8	10	**21**	2	2	0	0
teach	3	4	3	**12**	**18**	2	1
order	0	0	2	**12**	17	7	5
cause	0	0	0	3	2	**21**	17
break	1	0	0	4	2	12	**24**

Table 3. Ranking of the seven sentences with the verbs in terms of naturalness[24]

The numbers shown in the table represent how many people ranked the sentence with the particular verb at a given rank. For example, 22 participants ranked *know* as '1-perfectly natural,' while 11 participants ranked it as the second. On the other hand, no participants ranked *cause* as perfectly natural while 21 participants ranked it at 6.

See the bolded numbers in Table 3, showing the verbs of the largest number at each naturalness score: the most people judged *know* as the most natural, *break* as the least, and *teach* and *order* in the middle. The ranking of the sentences confirm the order of the naturalness score from the rating survey.

2.2.4. Discussion

The result from the rating survey shows that people's judgment on the compatibility is not clear cut as 'either compatible or incompatible.' Rather, there is a

[24] The sum of the column is not equal across the naturalness score since the subjects were allowed to choose multiple sentences for the same ranking.

degree of compatibility depending on the verbs. Note that the order of the verbs based on the naturalness score is not very different from the semantic compatibility based on the semantic analysis. It means that the native speakers' judgments are correlated with the linguistic observation.

The Ryan-Einot-Gabriel-Welsch *post-hoc* test showed that there are at least five distinct degrees of naturalness even though the boundary between them is not clear-cut. *Think* was the most natural / compatible, *hit* as the least natural / compatible, and *mean, teach,* and *tell* in the middle respectively. Linguistically, there were seven semantic compatibility categories of the SCC as shown in 2.1.3, but psychologically, seven degrees of naturalness may be too finely scaled for participants to distinguish. Based on the *post-hoc* test result, in the follow-up processing experiment, I will divide the verbs into five different degrees of semantic compatibility.

The ranking survey result supports the order of compatibility observed in the rating survey. Notice that the ranking survey result conforms not only to the order of the rating survey result but also to the linguistic observation in Figure 4 and Table 1. The verb *know* which is ranked as the most natural is the most compatible with the SCC according to the linguistic observation in that it is one of the most prototypical cognition verbs. On the other hand, *break* is ranked as the least natural and this result also conforms to the linguistic observation because this verb does not allow an independent event. The ranks of the other verbs also correspond to the observation from the semantic analysis: *like, mean*, and *cause* as the second, third and sixth most compatible with the SCC respectively. The exceptions are *teach* and *advise*. According to the rating and ranking survey, these verbs are not very different in terms of naturalness. However, according to the semantic analysis about the compatibility, they were predicted to show different naturalness due to the degree of influence of the main verb to the event in the complement. It seems that the difference in influence between *teach* and *advise* are not as psychologically big as I had expected.

In conclusion, even though there is a discrepancy mentioned above, the results from the rating survey and the ranking survey generally conform to the linguistic knowledge proposed in the semantic compatibility analysis in 2.1.

2.3. Processing Experiment

In the processing experiment, I examined the psychological effort needed to process verbs and constructions that vary in semantic compatibility. The processing effort was measured by the time taken to process the given word, i.e. the reaction time (RT). In other words, more effort to process one or more words is represented by longer RT. Therefore, the RT provides evidence for the hypothesis that the more a compatible lexical item is with a construction, the less processing effort it requires, while the less compatible a lexical item is, the more processing effort it requires.

2.3.1. Experiment Design

2.3.1.1. Participants and Materials

Twenty seven native speakers of English participated in the processing experiment, all undergraduate students at Rice University. These participants were different from the survey participants.

Among these 22 verbs used in the web-based survey in Table 1, I selected verbs which showed the most contrasting naturalness scores by conducting Ryan-Einot-Gabriel-Welsch *post-hoc* test. The *post-hoc* test showed that the verbs *think, mean, teach*, *tell*, and *hit* turned out to be significantly different from one another in terms of the naturalness score. Among these verbs, I selected four verbs, two of which are the extremes (*think* as the most natural and *hit* as the least natural), one of which has a naturalness score close to one of the extremes (*mean,* which is close to *think*), and one in the middle (*teach*). In order to make sure that the difference in RT is not exclusive for these four verbs only, I added four more verbs that showed the closest score to *think, mean, teach*, and *hit* respectively. As a result, there were four groups of verbs which showed different degrees of compatibility with the SCC: *think/learn, see/mean, teach/advise*, and *cause/hit.* (See Table 2 for the naturalness scores.) For the statistical analysis, when the two verbs of the closest naturalness scores are grouped together, the RTs of the two verbs that are termed "Group."

Among the stimuli sentences used for the web-based survey, the sentences with the eight verbs above were used for the processing experiment again. (See Appendix 2 for the complete list of the stimuli.)

The eight verbs selected from the survey result were used twice in different sentences, like in the web-based survey. This factor that a verb is presented twice in two different sentences is termed as "Sentence" in the experiment. Consequently, there were two "Sentences" for each verb. Therefore, 16 target sentences were constructed for the experiment. I inserted 32 filler sentences that are not related with the target construction. One set of eight target sentences with eight verbs and sixteen filler sentences comprised Block A and the other set of eight target sentences and the other sixteen filler sentences comprised Block B. Not only the target and the filler sentences within a block but the two blocks were presented in random order.

2.3.1.2. Method

Participants came to the linguistics lab individually by appointment and were told that the task is judging the naturalness of the sentences. Then, the participants read the sentences on the computer screen word by word in a self-paced reading paradigm. Right before the first word of the sentence was presented, an asterisk was shown to signal the beginning of the sentence. If they press the space bar on the computer, they could proceed to the first word of the sentence. By pressing the space key, they could proceed to the next words one by one. The time taken to press the key was recorded to measure the RT for individual words and the RT to process the whole sentence was also measured by adding up the RTs for individual words in the sentence.

When the participants complete reading each sentence, they were asked to rate the naturalness of the sentence that they had read. Not only the naturalness score but also the time taken to rate the sentence was recorded. In the processing experiment, I used five-point-scale, 1 as the most natural and 5 as the least natural because Ryan-Einot-Gabriel-Welsch *post-hoc* test revealed that only five degrees of naturalness is psychologically distinct.

When the participants completed reading each sentence, they were asked to rate the naturalness of the sentence that they had read. I used five-point-scale, 1 as ‘Perfectly natural. I can say it naturally,’ 3 as ‘I can't decide! It is natural in a way and unnatural in another way,’ 5 as ‘Completely unnatural. I will not say it in any circumstances.’ If they thought that the naturalness of the sentence is somewhere between 1 and 3 or 3 and 5, they used 2 and 4 respectively.

The specific RTs which I examined in this experiment were the time to process the word following the complementizer *that*. The reason why the RT for the complementizer *that* was not examined but the RT for the word following *that* was examined is that *that* is ambiguous as a complementizer and as a demonstrative. If participants read up to *that* as in (28a), at this point they may interpret the word *that* as a complementizer as in (28b) which this experiment intends, but they may also interpret it as a demonstrative adjective as in (28c).

(28) a. Billy hit *that*…

b. Billy hit *that* his father drank a glass of wine every evening.

c. Billy hit *that* ball with a bat.

The participants may interpret *that* as the part of speech they come across more frequently in usage because according to the usage-based model, it is a more cognitively entrenched pattern. For example, when *that* follows *hit*, the people will interpret it as a demonstrative pronoun or demonstrative adjective because *hit* is used with the demonstrative *that* much more frequently than with the complementizer *that*. On the other hand, if *that* follows *see*, it is not very certain whether people process it as a demonstrative or a complementizer because both are grammatical and used quite frequently. Because the RT for *that* has confounding factors other than the compatibility between the verb and the construction, the RT for *that* may not be a good indicator of the compatibility between the verb and the SCC. Instead, in the target sentences, the word right next to *that* was a subject as a proper noun such as *John* and *Kim* or a part of a subject noun phrase as a possessive pronoun such as *my* and *his*. This next word will be the clue showing that the word *that* is not a demonstrative but a complementizer which introduces a finite clause. Therefore, I measured the RTs to process the word following the complementizer *that*.

Also, I measured the RT to process the whole sentence. Thus, I controlled the number of syllables in the target sentences as seventeen as I stated in 2.2.1.1. Finally, I measured the RT for naturalness judgment in order to obtain the processing information for the meta-linguistic judgment.

Additionally, I recorded the naturalness scores for each sentence in order to confirm that the native speakers' judgments on naturalness after reading the sentence word by word conforms to the naturalness scores resulted from the web-based survey and the semantic compatibility analyzed based on the independence criteria.

2.3.2. Predictions

When analyzing the data, the verbs were ordered according to the naturalness score predicted by the semantic compatibility analysis in 2.1.3: in the order of *think, learn, see, mean, teach, advise, cause*, and *hit*. The predicted naturalness score of *think* was 1 (the most natural / compatible) and that of *hit* was 7 (the least natural / incompatible) in the survey. The prediction is that as the naturalness score increases, there will be a linear trend of the RTs: the RTs to process the word following *that* and the whole sentence are shorter in *think* and longer in *hit*.

2.3.2.1. Prediction on naturalness score

I predict that the naturalness score rated by the experiment participants will confirm the semantic compatibility analysis in 2.1.3 along with the results from the web-based survey. If a verb is more compatible with the construction SCC, the participants will score the sentence as more natural. If a verb is less compatible, they will score the sentence as less natural. Therefore, the prediction is that the naturalness score will show a linear trend through the verbs when the verbs are ordered according to the semantic compatibility.

2.3.2.2. Prediction on the RT for the word following *that*

I predict that the effect of the delayed RT would be shown in the word following *that*. A linear trend is predicted across the verbs: if the verb is incompatible with the SCC, the participants will take more time to process the word following *that*. Specifically, the RT to process the word following *think that* will be the shortest, and that for the word following *hit that* will be the longest, and that for the word following the "other verbs + *that*" will fall in the middle.

2.3.2.3. Prediction on the RT for the whole sentence

The total time taken to process a whole sentence may show a linear trend across verbs of different compatibility. Since the meaning or frequency of individual words in the sentence other than the target verb may influence the whole processing time, the result may not be as clear as that of the word following *that*. However, because I controlled the number of syllables within a sentence, I predict to find a trend that the more compatible verb with the construction will require less processing effort.

2.3.2.4. Prediction on the time for judgment

Another good indicator for the compatibility is the RT to judge the naturalness of the sentence. If a sentence is obviously natural or unnatural because the verb and the construction is either very compatible or incompatible, they will not hesitate to rate it as ‘perfectly natural’ or ‘completely unnatural.’ On the other hand, if the semantic compatibility between the verb and the construction is intermediate, the participants will feel that the sentence is intermediate in terms of naturalness. I predict that they will take more time to judge the naturalness. Therefore, the peak of the RT will be formed for the verbs in the middle in naturalness score, which will be *teach*/*advise*.

2.3.3. Results

The RTs and the naturalness scores obtained from the experiment are presented in Table 4. In this table, “individual” indicates individual verbs, and “group” indicates the averaged RT of the two verbs that show the closest naturalness score resulted in the survey.

		the word following *that*		the whole sentence		Judgment		Naturalness Score	
		Individual	Group	Individual	Group	Individual	Group	Individual	Group
think	Sentence1	507.56		7304.30		1639.81		1.11	
	Sentence2	507.00	556.35	4931.96	6133.75	1675.52	1878.32	1.11	1.10
	Average	507.28		6118.13		1657.67		1.11	
learn	Sentence1	645.56		6284.41		2345.04		1.07	

	Sentence2	565.30		6014.33		1852.93		1.11	
	Average	605.43		6149.37		2098.98		1.09	
see	Sentence1	600.04	548.15	5040.11	5767.37	3446.74	2641.16	1.85	1.45
	Sentence2	536.15		6235.00		2338.74		1.04	
	Average	568.09		5637.56		2892.74		1.44	
mean	Sentence1	580.67		6174.00		2817.07		1.59	
	Sentence2	475.74		5620.37		1962.07		1.33	
	Average	528.20		5897.19		2389.57		1.46	
teach	Sentence1	587.48	619.37	5351.33	6278.49	4223.81	3533.43	2.07	2.78
	Sentence2	649.00		6404.70		3905.89		2.63	
	Average	618.24		5878.02		4064.85		2.35	
advise	Sentence1	657.96		7091.85		3306.67		3.22	
	Sentence2	583.04		6266.07		2697.33		3.19	
	Average	620.50		6678.96		3002.00		3.20	
cause	Sentence1	578.78	676.12	6083.67	6338.48	2340.15	2429.94	4.78	4.72
	Sentence2	662.67		5754.41		2421.67		4.59	
	Average	620.72		5919.04		2380.91		4.69	
hit	Sentence1	638.59		6184.37		2571.78		4.81	
	Sentence2	824.44		7331.48		2386.15		4.70	
	Average	731.52		6757.93		2478.96		4.76	

Table 4. The RTs (unit: msec) resulted from the experiment and the naturalness score

In the following subsections, the RTs obtained from the experiment are statistically analyzed by the repeated measure ANOVA to see if there is a linear trend across the verbs. Also, the naturalness scores resulted from the experiment are compared with those resulted from the survey.

2.3.3.1. Result of naturalness score

The naturalness scores obtained from the experiment showed an equal pattern as the one expected in the semantic compatibility analysis. According to the repeated measure ANOVA, there was a linear trend across the naturalness score of this experiment ($F(1,26) = 1257.12$, $p < .001$, partial $\eta^2 = .98$). This linear trend matched the analysis of the compatibility between the verb and the SCC in that the cognition-speech verbs such as *think* are the most compatible while verbs that do not allow an independent event such as *hit* are the least.

Also, the verbs in a group should show similar naturalness scores in this experiment because the verbs of the closest score were selected from the online survey. The result in the experiment followed this prediction: the scores of *think* and *learn*, *see* and *mean*, and *cause* and *hit* are almost equal to each other. Statistically, there was no difference between the two verbs in each group. The only exception was the pair of *teach* and *advise* ($F(1,26) = 8.30$, $p < .01$), showing that people recognize the naturalness of these two verbs different. This is the different result from the web-based survey because in the survey, there was no significant difference between naturalness scores of *teach* and *advise*. On the other hand, the result from the experiment supports the semantic analysis that *teach* and *advise* different semantic compatibility: the former belongs to the weak attempt verbs and the latter belongs to the strong attempt verbs. The discrepancy between the survey result and the experiment result suggests that the verbs in the intermediate semantic compatibility are not stable in usage, so the acceptability judgments can be deviated depending on various factors such as participants and experimental environment and methods. For example, some participants may think of a situation where the sentence with teach in the SCC can be used quite naturally, while other participants may not. If so, the naturalness score of teach can be deviated from person to person. On the other hand, when a verb and the SCC is either compatible or incompatible, the naturalness score is quite consistent among the participants and contexts.

2.3.3.2. Result of the RT for the word following *that*

The repeated measure ANOVA showed that the RT for the word following *that* conforms to the prediction. In the experiment, the RT for the word following *that* was the fastest for *think* (507.28 ms) and the slowest for *hit* (731.52 ms). There was a linear trend that the RTs increase for the less compatible verbs ($F(1,26) = 6.24$, $p < .05$, partial $\eta^2 = .20$), meaning that the less compatible the verb and the construction are, the longer the RT is. Also, when two verbs with the closest naturalness score was grouped together, there was a linear trend across the groups ($F(1,26) = 5.53$, $p < .05$, partial $\eta^2 = .12$) as is seen in Figure 6. Therefore, this result supports the hypothesis that the less compatible lexical item with the construction requires more processing effort.[25]

---

[25] As in Table 4, The RT for *learn* (605.43 ms) was longer than *see* (568.09 ms) and *mean* (528.20 ms) and the RT for *see* was longer than *mean*. The delayed RT in *learn* made the RT for the group of *think/learn* slightly longer than the group of *see/mean* as we can see in Figure 6. Ideally, nevertheless, the RT for *learn* and *see* should have been no longer than *mean* because *mean* is less compatible than *learn* and *see*. However, the statistical analysis showed the linear trend of the RT but no quadratic trend ($F(1,26) = 1.84$, $p = .187$) nor cubic trend ($F(1,26) = 2.46$, $p = .129$), meaning that more delayed RT in *learn* and *see* than *mean* are not very significant. Also, the participants of the processing experiment judged *learn* as more compatible than *mean* and *see* as equally compatible as *mean*.

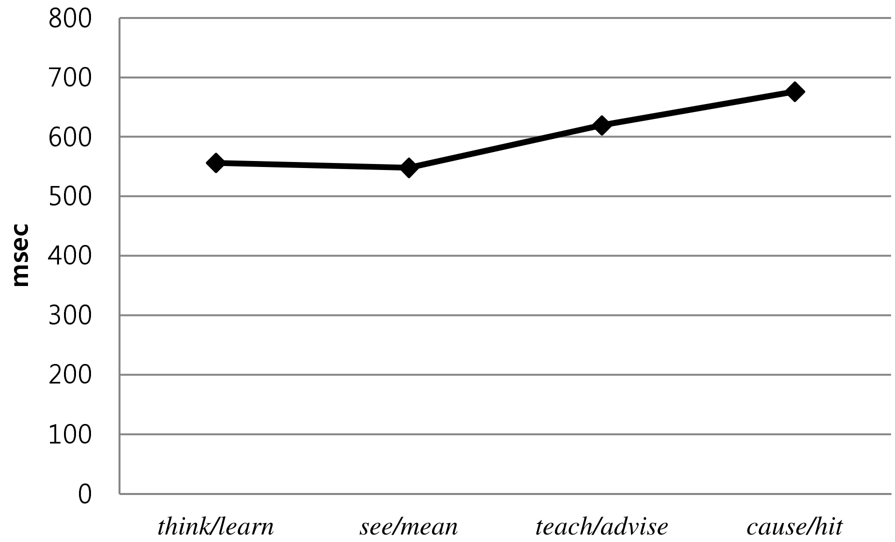

Figure 6 the RT for the word following *that* (grouped)

On the other hand, there was an interaction of "Verb" and "Sentence" on the linear trend ($F(1,26) = 7.73$, $p < .05$, partial $\eta^2 = .23$), meaning that for some verbs, one of the two Sentences had a tendency to be processed faster. Ideally, there should not be the effect of Sentence if the verb is the same because the result is expected to be influenced by the difference of the verbs, not by other factors in different sentences. In some verbs like *teach, cause*, and *hit*, Sentence 1 was processed faster than Sentence 2, but in the other verbs, Sentence 2 was processed faster. This difference made the interaction effect of linear trend.

However, when I compared the RT of two Sentences of the word following *that* in

---

Despite all these, it is true that the RTs for *learn* and *see* were slower than *mean* even though the word following *that* was all controlled to have only one syllable. Therefore, the reason for the delayed RT for *learn* and *see* should be analyzed further in the future study.

each verb by using *t*-test, none of them were significantly different. Moreover, the main effect of Sentence was not significant ($F(1,26) = .001$, $p = .912$), and the interaction of Verb and Sentence was not significant either ($F(1,26) = 1.61$, $p = .18$), meaning that the fact that each verb was presented twice in different sentences did not influence the RTs for the word following *that*. Therefore, I conclude that the different linear trend of the RTs in Sentence 1 and 2 for some verbs is not very significant.

2.3.3.3. Result of the RT for the whole sentence

The RT for total time to read the whole sentence failed to show correlation with the compatibility between the verb and the construction even though the number of syllables in a sentence was controlled. There was no significant linear trend across the verbs ($F(1,26) = 3.12$, $p = .089$). Also, when the verbs of the closest compatibility were grouped, there was no linear trend across the groups ($F(1,26) = 1.63$, $p = .214$). Therefore, the total RT to process the sentence is not a good indicator of compatibility in this experiment.

2.3.3.4. Result of the time for judgment

The RT for the naturalness judgment was the shortest for *think* (1657.67 ms) while the longest for *teach* (4064.85 ms). A notable result is that there was a quadratic trend across the verbs ($F(1,26) = 30.54$, $p < .001$, partial $\eta^2 = .54$) and also across the groups ($F(1,26) = 19.92$, $p < .001$, partial $\eta^2 = .43$) as is seen in Figure 7, which clearly shows that the peak in *teach* and *advise* is statistically significant.

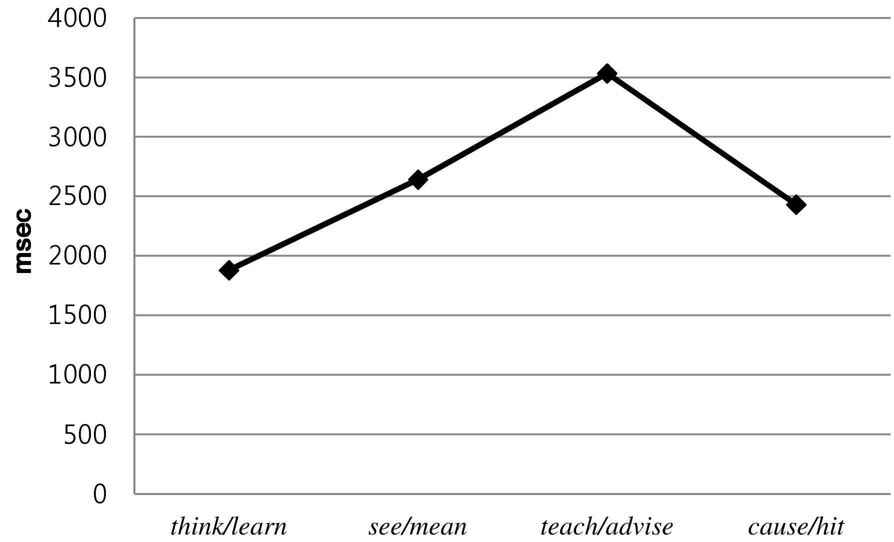

Figure 7. the RT to judge the naturalness of the sentences (grouped)

2.3.4. Discussion

The scores of the naturalness judgment in the experiment shows that the native speakers of English judged the naturalness of the sentence in the same way as the semantic compatibility analysis based on the criteria of the independence: the compatibility is not dichotomous as compatible and incompatible but there are different degrees of compatibility and the semantic compatibility, and this degree predicted from the linguistic point of view is correlated with the language user's intuition.

However, these scores provide information only about the end point of a process and do not give information in the course of the processing of the sentence. In other words, we do not know if the participants had difficulty in comprehending particular sentences or if they considered the naturalness of the sentence carefully. However, if we measure the time to process a certain unit of language and if it takes longer than the other units, we know that the participants had difficulty to process the unit compared with the others. Therefore, in this experiment, the RTs for the word following *that*, the whole sentence, and judgment of the naturalness of a sentence were measured.

When participants read up to the word following *that*, they realize that *that* is a complementizer introducing a sentential complement (SC). Therefore, the RT for the word following *that*, which is a subject or a part of the subject of the SC, is correlated with the degree of compatibility with the SCC. When the verb was a cognition-speech verb such as *think*, participants processed the combination of the verb and the construction more easily. On the other hand, when the verb was a strong attempt verb like *advise*, they had more difficulty in processing, and when the verb does not involve an independent event such as *hit*, the processing was the most difficult.

A possible reason why a verb incompatible with the construction requires more processing effort is the "coercion." For example, when *see* or *teach* was used with the SCC, *see* is coerced into a cognition meaning as in (25b) rather than the visual perception meaning. *Teach* is coerced to mean "giving information about a fact" rather than 'giving an instruction to do some actions' as in (22). Even for quite incompatible verbs like *make* and *break*, some participants in the web-based survey and consultants of English judged the examples as somewhat natural by positing some contexts. For example, they reported after the survey that they interpreted *John made that Mary did it* as the meaning of 'John pretended that Mary did it' and *John broke that Mary did it* as the meaning of 'John broke the news that Mary did it.' These informal reports show that people do not simply judge a sentence natural / unnatural immediately when they come across an incompatible verb with the target construction. Rather, they try to coerce the verbs in order to reconcile the semantic incompatibility and make sense out of the sentences. It has been claimed that when coercion occurs, more processing time is required (Piñango, Winnick, Ullah, & Zurif, 2006; Traxler, McElree, Williams, & Pickering, 2005). The delayed RT may be the effect of coercion.

Note that the experiment results suggest us reconsider the definition of coercion. The cases where the incompatibility is not reconciled have been ignored when discussing coercion because they have been regarded as ungrammatical. For example, it is possible that speakers fail to reconcile the incompatibility between the verb and the construction, and judge their co-occurrence not natural in the end as in the case of *cause* and *hit*. These cases have not been dealt with at all. However, as we have seen from the experiment results, the reconciliation can be different from person to person: some people could reconcile the incompatibility while others could not (e.g. *make* and *break* in the SCC, discussed above). Also, the incompatibility may be resolved with different difficulty depending on speakers or context: the incompatibility could be reconciled quite easily or with more difficulty. If we consider only the cases where the incompatibility is resolved as coercion and explain those cases only, then, how can we explain the cases where people take a lot of effort but failed to reconcile the incompatibility? In addition, the incompatibility may be or may not be resolved. Also, how can we explain the cases of the intermediate naturalness judgments and processing effort; what do they mean?

I claim that coercion is not just the theoretical explanation for the resolved incompatibility; rather coercion is the psychological process to reconcile the incompatibility. On this view, the cases where the incompatibility is not resolved can be discussed because whether or not the incompatibility is resolved the end stage of coercion process: it is possible that the incompatibility may not be resolved even if people try to resolve it. Also, the gradable processing effort can be explained because processing effort is a part of coercion: the co-occurrence of more semantically incompatible linguistic units requires greater effort for reconciliation.[26]

The total time to process the whole sentence was not systematic enough to be correlated with the compatibility. The compatibility itself may have affected the unsystematic difference in the total RT. For example, the verb *think* is compatible with the SCC. In this experiment, when people have no problem with processing the sentence up to the word following *that*, they may focus on the meaning of the whole sentence, and they take more time to consider the content. Therefore, even a sentence with a compatible verb may take time. On the other hand, *cause* is incompatible with the construction. If the participants realize that *cause* and the following constituent [*that* + SC] are unnatural to

---

[26] It is possible that the RT for *cause* and *hit* is longer because of the garden path phenomenon. As is pointed out earlier, *that* can be read as a complementizer and a demonstrative. When people read up to *John hit that…*, they are likely to read *that* as a demonstrative. When they realize that *that* is a complementizer, they re-process the sentence, and this re-processing may result in a longer RT for the next word to *that*. However, I claim that the compatibility of the verb with the construction is a more crucial factor for the longer RT. For example, other verbs like *learn, see, mean, teach* and *advise* can be followed by a demonstrative *that*. If the delayed RT is triggered by the garden path phenomenon, all these verbs should have shown similarly delayed RTs. However, the result of the experiment was that there was a linear trend of the RTs across these verbs. It means that these verbs, which are more compatible than *cause* and *hit*, showed faster RT than *cause* and *hit*. Therefore, I conclude that the compatibility with the construction is more crucial for the longer RT than the garden path phenomenon.

occur together, they may not focus on the content anymore because the sentence does not sound right to them already. This may have accelerated the RT for the rest of the sentence, and thus the total RT became not very long.

Moreover, even though I controlled the number of syllables in a sentence as seventeen, the words comprising each sentence were different from one another. It is possible that the different frequency of usage, concrete/abstract semantics, polysemy, and some other factors of other words in the sentence may have influenced to the total RT. In short, there are several confounding factor that may affect the total RT. Therefore, the total RT is not an appropriate indicator for the compatibility between a verb and the SCC.

The time for the naturalness judgment provided evidence that the participants took more effort to judge the naturalness when they encountered sentences of intermediate compatibility. The RT for the word following *that* shows the effort taken to process the word in the course of processing the sentence while the RT for the judgment provides information about processing effort for the final judgment. As the intermediate naturalness scores of *teach* and *advise*, shown in Figure 5, suggests, people do not totally reject the collocation of these verb and the SCC perhaps because the verbs in the intermediate incompatibility can be resolved with some processing effort: the participants managed to make sense out of the collocation although the verb and the construction are not very compatible. However, they will take more time to judge the naturalness of the sentence because the sentence is natural in a way because they could make sense, but it is not natural in another way because the collocation of the verb and the construction is not an entrenched pattern and requires more processing effort for coercion. On the other hand, if an incompatible verb like *hit* is used with the target construction, people may try to resolve the incompatibility in order to make sense out of the co-occurrence. Therefore, the RT for the word following *that* takes long. Despite the effort for coercion, they fail to reconcile the incompatibility, and the meta-linguistic judgment is quick and obvious as unnatural (or incompatible). Therefore, the RT for the naturalness judgment is an indicator for the compatibility with the construction: the co-occurrence of a verb and the construction that are either very compatible or incompatible is judged quickly as natural or unnatural whereas that of intermediate compatibility is judged slowly as somewhat natural.

2.3.5. Summary on the survey and the experiment

The online survey supports the linguistic observation in 2.1. When asked to rate the naturalness of the 44 sentence used with the selected 22 verbs, participants rated them as similar scores with the scores predicted by the linguistic observation on semantic compatibility, and the rated scores were gradual, not dichotomous. The ranking survey also showed a similar pattern.

Through the *post-hoc* test on the web-based survey, I selected 8 verbs and ran processing experiment for RT. Even though the RT for the whole sentence were not correlated with the compatibility between a verb and the SCC, the RT for the word following *that* was correlated with the compatibility. In other words, the more compatible a verb and the construction are, the less effort is required, and the faster the RT was. I claim that the more processing time is required due to coercion, which is redefined as the psychological process of resolving incompatibility between a verb and a construction. Coercion will be investigated more in depth in the following chapters dealing with a ditransitive construction.

2.4. Frequency in Usage

In this section, by using corpus data, I will examine which verbs are more frequently used with the SCC and which are less frequently used with the SCC. Since the written discourses are likely to depend on prescriptive grammar, the instances where less compatible verbs occur in the SCC such as *John taught that…* may not be frequently found from the corpus. Therefore, spoken discourses are better for the purpose of this study

However, if a corpus is oriented to casual conversation like Switch Board Corpus, the usage of the lexemes like *cause* and *advise*, which are more likely to be used in a formal register, will be rare, and the instances where these verbs are used with a sentential complement may not exist. For this reason, the corpus used in this study is Corpus of Spoken Professional American English (CSPAE). This corpus contains two million words transcribed in academic settings such as a committee meeting and White House press conferences which are question and answer sessions. Since the corpus is professional discourse, the conversation is closer to written discourse than casual conversations as in Switch Board Corpus. However, the corpus is still spoken data, so the corpus may serve intermediate language between written and spoken.

2.4.1. Corpus data description

In order to search for the instances where a verb is used in the SCC, I used a regular expression as in (29).

(29) [A-Za-z]*<w VV[A-Z]*> that<w CST>

This regular expression in (29) searches all instances where a complementizer or a relativizer directly follows a lexical verb (not auxiliaries and copulas) of all kinds of tense and aspect.

Next, I manually deleted instances which are not the cases of the SCC. Some of the examples are in (30).

(30) a. I think the decision was *made that* it was most important to deal with the migrant policy… (CSPAE_ WH94T)

b. In that meeting the President directed that several steps be taken,… (CSPAE_WH96AT)

In (30a), *that* is not a complementizer of the verb *make*, but a noun complementizer of *decision*. Therefore, these instances were excluded from the analysis. Also, when the SC takes subjuctive mood as in (30b), I excluded those instances. If the syntactic form of the sentential complement is already restricted as subjuctive mood, it cannot independently take its own tense and aspect. In other words, the complement is not syntactically/semantically independent of the main verb. On the other hand, the SC, discussed in the semantic compatibility section, the web-based survey, and the experiment, was the one that is independent of the main verb in terms of tense, aspect, and mood. Therefore, I excluded these instances as well.

After I excluded the instances that are not the case of the SCC, I obtained 3553 instances of the SCC. The number of verbs used in this construction as a main verb was 152.

(31) below summarizes the information of the search result of the SCC.

(31) Corpus description

a. the total number of words in the CSPAE: 2,030,000

b. the number of instances of the DC found by (29) (token frequency): 3553

c. the number of verbs used with the DC found by (29) (type frequency): 152

In order to examine which verbs among the 152 verbs occur with the SCC more frequently and which verbs occur with the SCC less frequently, I will analyze the frequency pattern of the verbs by using the methodology, called, “collexeme analysis,” which will be introduced in the next section.

2.4.2. Collexeme analysis

When talking about the frequency of the co-occurrence of a lexical item and a construction, we will need to consider relative frequency: a certain lexical item is used more frequently with a certain construction when compared with the case where this word is used with other constructions; and compared with the case where other words are used with this construction. For this purpose, I used **Collexeme analysis** (Stefanowitsch and Gries 2003, as applied by Gries et al. 2005, Gries et al. 2005, and Hilpert 2008).

Collexeme analysis is a method of measuring relative frequency of co-occurrence of a lexical item in a particular construction. This method uses the expression "attraction" between a verb and a construction. "Being strongly attracted" is a metaphorical way of expressing "co-occurring frequently." The analysis attempts to show which lexical items are more strongly attracted by a construction relative to other lexical items. At the same time, it also shows which lexical items are more attracted by a particular construction than by other constructions.

Collexeme analysis exploits a statistical significance test, called Fisher's Exact Test. Fisher's Exact Test tests whether two different factors are associated or not. We can apply this statistical method to the corpus analysis in order to see if the occurrence of *think* in a linguistic expression is associated with the occurrence of the SCC in an expression, for example. An expression where a particular verb is used in a particular construction can be analyzed as two factors: "Verb" and "Construction." Each factor can be analyzed as binary properties: whether or not the Verb is a particular verb (e.g. "*think*" or "not *think*") and whether or not the Construction is a particular construction (e.g. "SCC" or "not SCC"). For example, the sentence, *John thought that Mary was beautiful*, is analyzed as the Verb, "*think*" and the Construction, "SCC." The sentence, *John runs fast*, is analyzed as "not *think*" and "not SCC." In this way, we analyze all the sentences in the corpus as whether or not the verb is *think* and whether or not the construction is the SCC.

For the collexeme analysis, we need four frequencies as in Table 5: the number of instances where the target lexeme (e.g. *think*) is used with the target construction (e.g. SCC), which is (a) in Table 5, the number of instances where other (non-target) lexemes are used in the same slot in the target construction (b), the number of instances where the target lexeme is used with other (non-target) constructions (c), and the number of instances where other (non-target) lexemes are used with other (non-target) constructions (d).

	Target lexeme (e.g. *think*)	Other lexemes (e.g. non-*think*)
Target construction (e.g. SCC)	a	b
Other constructions (e.g. non-SCC)	c	d

Table 5. Frequency information necessary for the collexeme analysis

With the numbers in a, b, c, and d, supplied by the corpus search, we obtain the *p*-value of the Fisher's Exact Test for each verb that occurs with the construction. The *p*-value is the indicator of the **collostruction strength**: the smaller the *p*-value is, the stronger the collostruction strength is. By means of Fisher's Exact Test, we can tell whether there is a significant association between the target lexeme and the target construction. If the probability (*p*-value) is small enough, we can conclude that the occurrence of the lexeme with the construction is not accidental, in other words, that there is an association between the lexeme and the construction.

However, with the *p*-values resulting from the statistical test, we cannot easily identify which verb's collostruction strength is larger than those of the others, due to the cases with extremely low values. For example, the *p*-value of *demonstrate* in the SCC, analyzed in this study, was 0.0000147291 while that of *mean* was 0.0001463395. It is hard to compare which of the two has stronger collostruciton strength at a glance. Therefore, the collexeme analysis exploits log-transformation to make the collostruction strength easily identifiable. After taking $-\log_{10}$, the former is transformed to 4.9820769205 and the latter is transformed to 3.8346384095. Now, with these transformed values, we can easily tell that *demonstrate* is more strongly attracted by the SCC than *mean*. In this way, it gets easier to compare the collostruction strength. The larger the value is, the stronger the collstruction strength is. Based on the collostruction strength of each verb, we can rank them to say which verb is more associated with the construction than others.

Note that collexeme analysis does not necessarily require a cut-off value of the *p*-value to decide strictly whether the lexical item and the construction are associated or not, because the aim of this analysis is not to categorically determine that they are related or not. Rather, it aims to show which lexical items are more strongly associated with a particular construction than other lexical items are.

Also, note that the ranking of the collostruction strength is not absolute across different corpura. However, because of the way the corpus was constructed, being selected from various genres and registers used by speakers from various backgrounds, we can be reasonably confident that our results are representative. Therefore, the result of the collexeme analysis of a particular corpus data shows a general tendency that the lexeme L is likely to be used frequently (or not used frequently) with the construction C within the corpus.

2.4.3. Result of Collexeme Analysis of [V + [*that* + SC]

First, I will show the frequency pattern of the eight verbs used in the experiment. The ranks according to the collostruction strength are presented in Table 6

Verb	Semantic Category	Collo_Rank
think	Cognition-speech	4

learn	Cognition-speech	126
see	Perception	138
mean-H[27]	Intention	47
teach	Weak-attempt	---
advise	Strong-attempt	139
cause	Manipulative-implicative	---
hit	No independent event	---

Table 6. The collostruction rank of the eight verbs used in the experiment

As we can see in Table 6, the verb that is the most strongly associated with the SCC is *think*, and for *learn, see*, and *advise*, the association becomes weaker as the verbs get semantically less compatible, and *teach*, *cause* and *hit* does not occur in the SCC in the current corpus at all. Except for *mean*,[28] the frequency pattern of the eight verbs tested in the experiment generally follow the prediction that the verbs that are less compatible with the SCC are less frequently associated with the construction.

In addition to the frequency pattern of the eight verbs above, when we look at the distribution of the all verbs occurring in the SCC in the current corpus, ranked according to the collostruction strength, we can see that most verbs occurring with the SCC were cognition-speech verbs and these verbs were spread throughout the whole ranks. The

[27] I divided the cases into two: whether the subject of *mean* is human or non-human. "*Mean*-H" in Table 6 indicates the instances of *mean* with a human subject. When the subject of *mean* was used with a non-human subject such as *that* and *it*, it is not an intention verb as discussed in 2.1.3.6 because there is no meaning of intention at all. There were 146 instances of *mean* used in the SCC with a non-human subject.

[28] Just as the processing time of *mean* was faster than that of *learn* and *see, mean* is more strongly associated with the SCC than *learn* and *see*. The verb *mean* needs more examination in the future.

twenty most strongly associated verbs are cognition-speech verbs. (See Appendix 3 for the list of all verbs used in the SCC and their collostruction strength.) Figure 8 below presents which verbs in each semantic compatibility category occur in the SCC. Since there were 152 verbs found, I will present only representative verbs with their ranks in the parentheses.

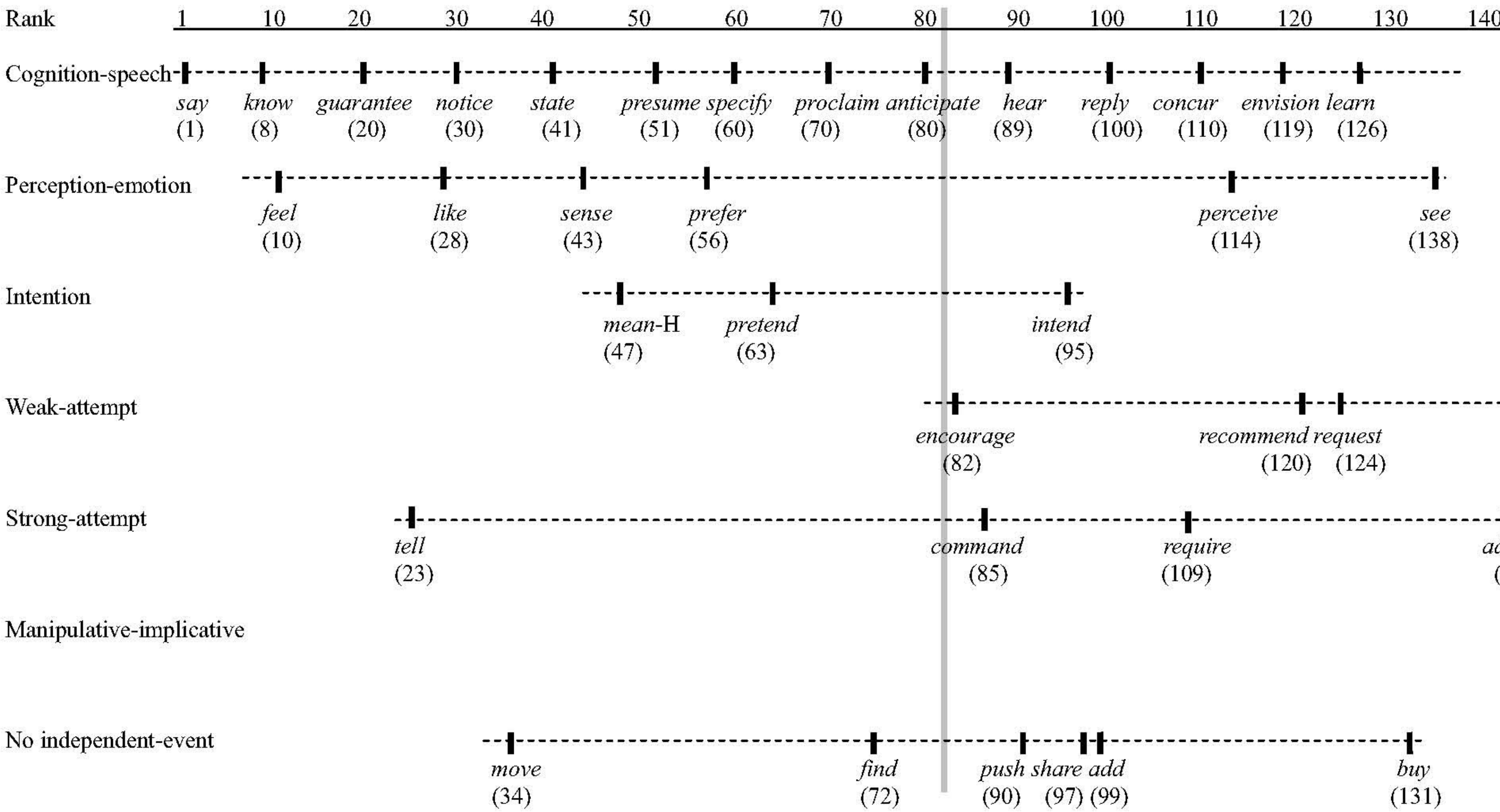

Figure 8. Result of the collexeme analysis of the SCC

In this study, for convenience of discussion, I set up a potential cut-off point to divide the verbs that are more strongly associated with the DC and those that are less strongly associated with the DC. In Figure 8, the vertical grey line is drawn at the position between the 81th and 82th ranks, where the *p*-value of the Fisher's Exact Test is .05. The verbs up to the 81th rank can be said to be frequently associated with the SCC whereas the rest of the verbs are relatively not frequently associated with the SCC.

Even though there was not a clear boundary to show that the verbs that are more compatible with the SCC occur more frequently and the verbs that are less compatible occur less frequently, we can still see such a pattern. The cognition-speech verbs are distributed throughout the ranks. Due to the limit of the space, I could show only three verbs within the 20th rank, but as I stated earlier, most of the twenty verbs that are the most frequently associated with the SCC were cognition-speech verbs. Perception-emotion verbs and intention verbs are relatively frequently associated with the SCC. On the other hand, weak-attempt verbs, strong-attempt verbs, and the verbs without independent event are relatively less frequently associated with the SCC. There was no instance of manipulative-implicative verbs occurring in the SCC.

The following table summarizes twenty verbs that are the most strongly attracted by the SCC (i.e. more frequently associated with the SCC), the number of instances used in the SCC and the total number of instances of the verb found in the corpus regardless of the co-occurring construction, and the collostruction strength.

Rank	**Verb**	**Uses in SCC**	**Number of Instances**	***p***	**Collo_Strength**

1	say	1088	8526	0	∞[29]
2	suggest	196	748	1.5E-152	151.8142
3	believe	153	549	1.3E-123	122.8785
4	think	321	3868	1.9E-98	97.72035
5	indicate	127	548	8.15E-92	91.08879
6	assume	75	222	2.94E-68	67.53142
7	hope	80	269	1.11E-67	66.9543
8	know	255	3473	2.83E-67	66.54813
9	ensure	66	160	4.49E-67	66.34813
10	feel	86	549	6.51E-48	47.18653
11	agree	75	600	4.01E-35	34.39659
12	argue	44	203	2E-31	30.69846
13	note	35	115	7.51E-31	30.12457
14	recognize	38	179	5.36E-27	26.27112
15	acknowledge	23	80	3.74E-20	19.42756
16	decide	46	500	8.02E-17	16.09586
17	understand	54	727	1.8E-15	14.74542
18	ask	3	1964	2.79E-14	13.55366
19	imply	17	70	6.24E-14	13.20483
20	guarantee	18	82	7.66E-14	13.11549

Table 7. Twenty verbs the most attracted by [V + [*that* + SC]

As we can see in Table 7, the verbs most frequently used with the SCC are cognition verbs such as *believe, think, assume, hope, know, recognize, understand*, and so on. We can see that the event designated by these verbs do not affect the world outside. Rather, the Agent of these verbs assesses the entity or event in the world. The semantics of these verbs are compatible with the semantics of the target construction in that the event in the SC is not influenced by the action of the main verb, and therefore, independent of the main verb event.

Another type of verbs is speech verb or at least verbs that express some ideas

[29] The collostruction strength of *say* was so strong that the strength was almost infinity.

such as *say, suggest, argue, imply* and so on. When these verbs are used in the SCC, they mean reporting or expressing the Agent's idea or the event in the world without affecting the world as in (32).

(32) a. President Bush *said* that this was a threat to our security interests. (CSPAE_WH94T)

b. … you might *argue* that it was too hard as a 10-minute task. (CSPAE_COMM697T)

c. I think we're still in dialogue, so I don't want to *suggest* that it's completed. (CSPAE_WH94T)

In (32a), the president reported his opinion and in (32b), the subject might state and try to give a reason that the test was too hard. In (32c), *suggest* means mentioning or implying that they are still in dialogue. Neither of these verbs in the main clause does not affect the proposition in the SC. The meaning of the verbs in (32) is compatible with the meaning of the SCC in that the content in the SC is independent of the main verb action.

However, some speech verbs such as *suggest* and *argue* were used to involve an intention of the main verb Agent or make the main verb action influence on the event in the SC. For example, it is possible that the Agent tries to affect the world outside by suggesting, arguing, or indicating some ideas. In these cases, the sentential complement carries deontic modality by taking an auxiliary like *should* or *ought to* as in (33).

(33) I would *suggest* that you <u>should</u> at least move back in the direction of the

80 percent statement and get closer, at least, to a 50/50 scoring. (CSPAE_COMM8A_1)

In the case of (33), the semantic property of the SC is restricted as deontic modality. When these auxiliaries are used in the SC, the main verb is interpreted as a weak-attempt verbs rather than a cognitive-speech verb: the main verb Agent (MA) in (33) has an intention to affect the complement event to occur, and the influence of the MA on the complement Agent (CA) gets greater.

Actually, in the corpus data, when weak attempt verbs (e.g. *recommend,* and *request*) strong attempt verbs (e.g. *require* and *advise*) were used in the SCC, the complement contained auxiliaries such as *would, could, should*, and *ought to*. In other words, the verbs that are less compatible with the SCC than cognition-speech, perception, and intention verbs are likely to occur in the SCC when the modality of the complement is deontic, being expressed with auxiliaries such as *should* or *ought to*. This means that the more compatible verbs are likely to occur in the SCC with the complement of various tense, aspect, and mood while less compatible verbs can occur in the SCC in relatively restricted condition.

Let us now turn to the verbs which are the least attracted (the least frequently associated with) by the SCC.

Rank	**Verb**	**Uses in SCC**	**Number of Instances**	***p***	**Collo_Strength**
133	*promise*	1	44	0.601413	0.220828
134	*testify*	1	45	0.60966	0.214913
135	*comment*	3	228	0.637978	0.195195
136	*maintain*	2	149	0.77383	0.111354
137	*accept*	5	217	0.808189	0.092487
138	*see*	77	3683	0.906781	0.042498

139	*advise*	1	75	1	0
139	*aggregate*	1	48	1	0
139	*arrange*	1	55	1	0
139	*articulate*	1	49	1	0
139	*care*	1	76	1	0
139	*convey*	1	73	1	0
139	*disagree*	1	59	1	0
139	*establish*	4	234	1	0
139	*forget*	1	74	1	0
139	*remind*	2	111	1	0
139	*repeat*	1	63	1	0
139	*speculate*	1	92	1	0
139	*undertake*	1	57	1	0
139	*wish*	1	65	1	0

Table 8. Twenty verbs the least attracted by the SCC

Some of the verbs in Table 8 can be used to mean a motion rather than cognition and speech as in (34).

(34) The railway company extended line to Brightlingsea to *convey* fish direct to Billingsgate. (CCED_AL)

In (34), *convey* refers to a physical motion of “to transport.” This verb is not perfectly compatible with the SCC because it does not involve an independent event to occur.

However, this verb can be metaphorically used as a speech verb in the meaning of communication when it occurs in the SCC.

(35) So how does one *convey* that this is not contradictory information? (CSPAE_ COMR6A_1)

In (35), what is metaphorically conveyed is an idea described by the SC. Since the idea cannot be physically transported, the verb *convey* is coerced to the meaning of speech.

Verbs like *accept* and *arrange* can refer to a physical motion (e.g. *Your old clothes will be gratefully accepted, She enjoys arranging dried flowers*), but often refer to an action that involves cognition-speech or MA's attempt as in (36).

(36) a. Eventually Stella persuaded her to *accept* an offer of marriage. (CCED_AL)

b. She *arranged* an appointment for Friday afternoon at four-fifteen. (CCED_AL)

In the accepting action in (36a), the Agent has to consider the offer and mentally or verbally agree with the idea described by the SC. In this sense, the verb involves cognition or speech. In the arranging action in (36b), the Agent examines her schedule and sets up a new appointment, and by arranging an appointment, the Agent may influence the event in the future to be performed. These verbs usually require a noun object indicating an event or an idea such as *plan, appointment, offer, idea,* and *fact*. Instead of these nouns, the events and ideas can be expressed in more detail as a proposition in the form of the SC, and thus, these verbs can be used in the SCC as below.

(37) a. …I'm very uncomfortable in *accepting* that that's somehow a door that's closed in the future of the exam. (CSPAE_ COMM8A_1)

b. … we wanted to make these activities more visible and also to *arrange* that the resources flow to these kinds of activities (CSPAE_ FAC97T)

In (37a), the accepted fact is expressed as a proposition in the SC. Also, in (37b), the plan or the policy that will be arranged is expressed as the SC. Even though they can occur in the SCC, they are not very frequently associated with the SCC because they usually occur with a noun object instead of the full proposition.

Also, many verbs such as *testify, repeat, comment*, and *articulate* in Table 8 can be categorized as a cognition-speech verbs in that they state or mentally consider an independent event. The difference of these verbs from the prototypical cognition-speech verbs such as *think* and *say* is that *testify, repeat, comment*, and *articulate* can be often associated with other constructions such as a transitive construction. These verbs often take an abstract entity such as *procedure, idea*, and *plan* as a direct noun object instead of taking a sentential complement. Because of the strong association with other constructions, these verbs seem to be ranked low in terms of association with the SCC.

Interestingly, there were six verbs that prototypically do not involve an independent event, which were *move, find, add, share, push*, and *buy*. These verbs are not perfectly compatible with the SCC in that there is no independent event involved in these actions. They usually indicate a physical action, like "moving the camera," "find a pistol," "adding the cheese," "sharing rooms," "pushing the door," "buy a bike" (all from CCED_AL).

However, even though the raw frequency is small, these verbs are actually used in the SCC by some speakers. If so, the meaning of the verb is overridden by the meaning of the construction. The construction posits another event which is independent of the main verb event by coercing the meaning of the main verb into the meaning of cognition-speech.

(38) a. I just want to *share* that I have a concern that this test is getting further away from instruction. (CSPAE_COMR6B_1)

b. Our colleagues in other disciplines just don't *buy* that we have all that much of a leadership there. (CSPAE_COMM8A_1)

c. Or are you *pushing* that we really should consider more context? (CSPAE_COMR6B_1)

d. But I want to *add* that there 's another issue,… (CSPAE_ COMM797T)

e. … you may *find* that it matches very nicely. (CSPAE_COMM897T)

In (38), the construction SCC suppresses the interpretation of the main verb as a concrete physical motion like sharing a room, buying a bike, pushing the door, and adding the cheese. In these examples, the complement of the main verb is a proposition expressed in the SC, so the main verbs *share, buy, push*, *add,* and *find* cannot be interpreted as a physical motion. Rather, they are interpreted as a cognition-speech verb. For example, *share* in (38a) means having the same idea with others, and *buy* in (38b) means accepting the idea, *push* in (38c) means claiming the fact or the idea, *add* in (38d) means expressing one more fact, and *find* in (38e) means recognizing the fact. In short, the meaning of these verbs is metaphorically used as the meaning of cognition-speech.

In the case of some verbs like *move* (verbs with no independent verb), *see* (perception-emotion verb), and *tell* (strong attempt verb), when these verbs occur in some other constructions, they indicate physical action such as "moving a box," "seeing a movie," "telling someone to do an action / telling a story." When it is used in the SCC, the construction meaning prevents us from interpreting the verbs as a physical action verb as in (39).

(39) a. I can *tell* that this is going to be a really big success. (CSPAE_COMM597T)

b. So you're *moving* that we limit the time of debate? (CSPAE_FAC95T)

c. … you will *see* that the relationship is a very strong one (CSPAE_WH94T)

In (39), the prototypical meaning of the main verbs is considered concrete and physical, but the meaning of the construction requires a mental/cognition or speech verb. When these verbs and the SCC occur together, the verb meaning is coerced to involve an independent event. For example, *tell* (39a) can be interpreted as judging rather than physically speaking. *Move* in (39b) means 'formally suggest.' The verb *see* in (39c) is not just a perception-emotion verb, but it means 'know.' The conceptual metaphor UNDERSTANDING IS SEEING (Lakoff & Johnson, 1980) is applied easily when the construction is the SCC. In all these examples, we know that the verbs are polysemous depending on the linguistic contexts but the construction help us interpret them as the correct meaning.

2.4.4. Summary of the collexeme analysis

The result from the collexeme analysis showed approximate correlation with the degree of semantic compatibility that more compatible verbs are more frequently associated with the SCC while less compatible verbs are less frequently associated with the SCC. In the corpus, the cognition-speech verbs were the most prevalent with the SCC, and the most frequently associated with the SCC were the cognition-speech verbs, as well. When less compatible verbs, such as weak-attempt verbs and strong attempt verbs, occur with the SCC, the condition of the SC is more restricted as having deontic modality. There was no instance of the manipulative-implicative verbs occurring with the SCC. However, there were some cases of the verbs with no independent verbs such as *push, share*, and *buy*. When these verbs occur in the SCC, the verb meaning is coerced to have the cognition-speech meaning (e.g. to express, recognize, or accept the fact or the idea).

2.5. Conclusion

This chapter attempted to provide evidence to the prediction of the usage-based model that the linguistic knowledge of the semantics of linguistic units, the frequency of their co-occurrence, and processing effort are all correlated. The construction observed in this study was the SCC, [V + [*that* + SC]]. This construction requires an independent event as its complement. Therefore, the cognition-speech verbs are the most compatible, while verbs that make the complement event less independent are less compatible, and verbs that do not allow an independent event are not compatible.

The web-based survey showed that the compatibility between the lexical items and the construction is not dichotomous but there is a degree of compatibility. It also proved that the linguistic observation about the compatibility was true for the native speakers' judgments. The following experiment on processing showed processing effort in relation with the compatibility. The RT for the word following *that* and the RT for the naturalness judgments showed that the more compatible a lexical item and the construction are, the less effort is required, and the faster they are processed. The frequency data also conforms to the linguistic observation and the experiment: the more compatible the lexical item and the construction are, the faster the processing is, and the more frequent the usage is. Consequently, this study supported the assumptions of the usage-based model by correlating four aspects of language, which are linguistic knowledge, acceptability judgments, processing, and the frequency of the usage.

Closer examination on the empirical data showed that linguistic knowledge is flexible and dynamic. When verbs like *teach* and *advise* are presented with the SCC, which seems incompatible at a glance, people did not reject this combination immediately as we can see in the naturalness score and the RT for the judgment. Rather, they tried to process it, and resolve the existing incompatibility by taking more time. In other words, coercion occurs. The coercion effect is represented in the delayed RT for the word following *that* and in the naturalness judgment. In addition, there are instances where this combination was actually used in the corpus data.

In order to show that the correlation of the four dimensions of language is not restricted to the SCC only and provide possibility to generalize the correlation, I will examine one more construction, which is, the ditransitive construction. Moreover, in the following chapters, I will not only correlate the four dimensions, examined in this chapter, but also investigate the coercion effect in more detail with the ditransitive construction. The semantics of the SCC is relatively abstract in that the complement event is independent of the main event. Thus, examining how the semantic properties of the less compatible verbs conform to the constructional meaning of the SCC is limited to show rich semantic interaction between the verbs and the construction. However, the ditransitive construction involves more concrete semantics: an Agent transfers, a Patient is transferred, and the Recipient receives. I expect that the coercion effect occurring in the ditransitive construction will lead richer discussion on the semantic interaction between the verbs and the construction.

3. Semantic Compatibility between the English Ditransitive Construction and Various Verbs

This chapter examines the degree of semantic compatibility between a verb and a ditransitive construction [V NP1 NP2] (DC, henceforth) in English.

Following the usage-based model, proposed by Langacker (1988), I will ultimately correlate the linguistic knowledge about semantic compatibility between various verbs and the DC with language use: frequency of their co-occurrence, processing effort, and acceptability judgments. This chapter is specifically dedicated to examining the semantics of the construction and the various verbs that occur with the construction. Based on the constructional and verbal meanings, I will determine the different degrees of semantic compatibility between the DC and the verbs. The semantic compatibility investigated in this chapter will be the basis on which we will observe the relation between semantic compatibility and empirical evidence in the form of frequency and processing experiments.

Examining the semantics of various verbs will show what semantic properties of the verbs are important so that verbs and the construction occur together. If a verb is less compatible with the construction but it can occur with the construction, I will examine how the incompatible verb semantics can conform to the constructional meaning (i.e. coercion).

3.1. The meaning of the ditransitive construction

Following Langacker (2009) and Goldberg (2009a, 2009b), I assume that syntax and semantics are not autonomous and the syntax of the DC reflects its meaning. The construction requires three arguments: a subject, an indirect object, and a direct object. In (40), *he, me,* and *paper* correspond to the subject, the indirect object, and the direct object.

(40) He *handed* me a little rectangle of white paper. (CCED_AL)

Semantically, the three syntactic arguments above correspond to an Agent, a Recipient, and a Patient respectively: *he* is the person who causes an entity to be transferred (Agent), *me* is the person who receives the entity (Recipient), and the *paper* is the entity being transferred (Patient). In the DC, these participants interact in the event frame of giving, receiving, and transfer.

We can abstract the meaning of the DC from sentences that have similar patterns like (40). Goldberg (1995: 141) proposes that the sense of the DC is 'successful transfer between a volitional Agent and a willing Recipient.'

In the meaning of the DC defined by Goldberg, the conditions of the meaning of the arguments such as 'volitional' and 'willing' are generally conveyed by the arguments, while the meaning of transfer is conveyed by the verb. To focus on the verb meaning, I assume that the conditions of the arguments are met: the Agent is volitional, the Patient is an entity that can be transferred, and the Recipient is willing to receive the Patient. Then, the only meaning at issue is 'successful transfer' and this semantic property is attributed to the verb meaning.

Another semantic property that the DC carries is the notion of 'possession' (Pinker 1989). The notion of possession rises from the fact that the participants in the transfer event denoted by the DC are human beings. That the Agent is 'volitional' and the Recipient is 'willing' implies that the Agent and the Recipient are human beings rather than an object or a location. For example, in (40), *he*, the Agent originally possessed the piece of paper, and he transferred it to *me*, the Recipient, and thus, it entered the possession of the Recipient.

Now, let us discuss the interpretation of (41).

(41) Martha gave the church [Recipient/*Location] his clothes.

In (41), NP1 is *the church*, a location, but we understand that Martha gave the clothes to a person who represents the church rather than to the church building itself. The transfer occurring between these two people are viewed as the transfer of possession. Therefore, 'successful transfer,' denoted by the DC, is actually "successful transfer of possession."

In order for a verb to be semantically compatible with the DC, it should share the meaning of 'transfer of possession." Thus, as a way to determine the semantic compatibility between the DC and the co-occurring main verb, I will examine the degree that the verb involves transfer of possession.

Before we examine the semantics of verbs in detail, I will discuss the concept of "transfer." There are several levels of abstractness possible in the concept "transfer." First, the least abstract transfer is 'physical transfer.' This concept of transfer designates a situation where a concrete entity is possessed by the Agent and the Agent transfers the entity to the Recipient, and the Recipient physically possesses the entity in the end. (40) discussed above is an example of physical transfer.

Second, the transfer can be metaphorical. There are different types of metaphors involved. One type of metaphorical transfer involves ownership. For example in (42), *the mansion*, the Patient is not an entity that can be physically moved.

(42) He *bequeathed* his son the mansion in Hampshire. (CCELD)

In this case, it is not the mansion itself that is transferred, but the ownership of the mansion is transferred. Even though there has been no physical transfer between the Agent and the Patient, the transfer of the ownership occurs.

A third type of transfer is still metaphorical transfer, but it does not involve ownership or possession, as in (43).

(43) Will you *tell* me the story? (CCED_AL)

In (43), the Patient, *the story*, is not physically transferred or possessed because it is not a concrete entity. Via conduit metaphors, COMMUNICATED INFORMATION IS AN OBJECT and COMMUNICATION IS SENDING (Reddy 1979, as cited by Goldberg 1995), *the story* is understood as if it is a transferrable entity and the action of 'telling the story' is understood as if it is the action of transfer. Consequently, it is understood that the Recipient receives information.

Last, the most abstract concept of transfer is the concept of benefactive as in (44).

(44) She *danced* us a waltz. (Pinker 1989: 115)

In this sentence, *a waltz* cannot be physically transferred. No one owns *a waltz*. Therefore, (44) is different from both (40) and (42). It is also different from (43) because in (43) the Recipient metaphorically receives the Patient, *a story,* while in (44) what is transferred is the whole action performed by the Agent. For example, in (43) the Agent gives information in the form of the story to the Recipient whereas in (44) the Agent does not give *a waltz*. Rather, the Agent gives the Recipient the whole action of 'dancing a waltz' for the benefit of the Recipient. This benefactive meaning involves the metaphor 'actions which are performed for the benefit of a person are objects which are transferred to that person' (Goldberg 1995: 150).

The last level of transfer, which is the benefactive meaning, is subsumed in transfer throughout all the levels of abstractness (Pinker 1989: 117). Pinker pointed out that 'the cognitive content of the notion of "benefactive" and "gaining possession" may be similar' (Pinker 1989: 117). Through the event of transfer, the Recipient is benefited because he/she obtains the Patient either physically or metaphorically. For example, in (40)-(43), the Recipient obtains a piece of paper, the ownership of a mansion, or information in the form of a story, and the Recipient is benefited by receiving the Patient. Even if the Recipient in (44) does not receive anything literally, *us* is still benefited, probably emotionally: *we* were pleased to see the waltz.

The evidence that the DC inherently has a benefactive meaning is (45).

(45) ?? Sally *burned* Joe some rice.(Goldberg 1995, 146)

The syntactic frame of (45) is the same as (44), but it seems that the verb *burn* is not very compatible with the DC. Because the rice is damaged by the action of *burn*, Joe is hardly benefited by receiving the burnt rice. Since the malefactive meaning of *burn* is incompatible with the benefactive meaning of the DC, most people would judge (45) not very acceptable. On the other hand, however, (45) might sound better if *Joe*, the Recipient, wanted the rice burnt. In this context, Sally burned the rice for the benefit of Joe. This benefactive interpretation of (45) is possible via virtue of the benefactive meaning of the DC. Therefore, we can say that the benefactive meaning is inherent to the DC.

The slight semantic difference between the DC and its alternative construction can confirm that the semantic properties of the DC is "transfer of possession and benefit subsumed." When a sentence with the DC is paraphrased, it can be alternated either to a construction with *to*-PP (i.e. dative construction) as in (46) or a construction with *for*-PP (i.e. benefactive construction) as in (47) depending on the verb.

(46) a. Tom gave Sally a book.

b. Tom gave a book to Sally.

(47) a. John made Mary a small toy.

b. John made a small toy for Mary.

(46b) carries the meaning of transfer, but the difference of the dative construction from the DC is that a Location cannot be used in the DC as shown in (41). This means that 'possession' is one of the semantic properties of the DC. It is also possible that a Location is not used in the DC because the DC carries a benefactive meaning as well. Only a person can be benefited. The difference between (46a) and (46b) suggests that the DC not only carries the meaning of transfer but also a notion of possession and benefit.

The difference of (47a) and (47b) is that most people think that Mary physically received the toy in (47a), or at least John had intention to physically transfer the toy to Mary, but not necessarily in (47b). This means that the DC strongly implies transfer of possession.

Based on the different semantics of the DC from the alternative constructions, we can conclude that the DC carries the meaning of transfer of possession, and benefactive meaning is implied.

Understanding that the salient meaning of the DC is 'transfer of possession' and the benefactive meaning is implied in all levels of abstractness of transfer, I will discuss the semantics of verbs and how compatible they are with the meaning of the DC in terms of the degree to which the notion of 'transfer of possession' is salient. My prediction is that if the more is the notion of transfer of possession involved in the event denoted by the verb, the more is the verb compatible with the DC.

3.2. Verb Semantics

Pinker (1989) and Gropen et al. (1989) categorized the verbs that can be used in the DC into several subclasses. Goldberg (1995: 126) adopted and modified these subclasses when discussing the English ditransitive construction. The following table summarizes the subclasses and the verbs in each subclass.

<table>
<tr><th colspan="2">Verb Subclass</th><th>Examples</th><th>Goldberg's modification</th></tr>
<tr><td colspan="2">Verbs that inherently signify acts of giving</td><td>give, pass, hand, sell, trade, lend, serve, feed</td><td></td></tr>
<tr><td colspan="2">Verbs of instantaneous causation of ballistic motion</td><td>throw, toss, flip, slap, poke, fling, shoot, blast</td><td></td></tr>
<tr><td colspan="2">Verbs of sending</td><td>send, mail, ship</td><td></td></tr>
<tr><td colspan="2">Verbs of continuous causation of accompanied motion in a deictically specified direction</td><td>bring, take</td><td></td></tr>
<tr><td>Verbs of future having</td><td>The subject argument acts to cause the first object argument to receive the second object argument at some later time</td><td>bequeath, leave, forward, allocate, assign,</td><td>Goldberg divided this class into three subclasses.</td></tr>
</table>

	Transfer occurs only if the conditions of satisfaction associated with the act denoted by the predicate hold	*promise, guarantee, owe*	
	The subject argument only enables the first object argument to receive the second object argument	*permit, allow*	
Verbs of communicated message		*tell, show, ask, teach, write, read, quote, cite*	This subclass should be made distinct from the verbs of propositional attitude such as *say, assert, claim, doubt*.
Verbs of instrument of communication		*radio, email, telegraph, wire, telephone, fax*	Goldberg (1995, 128): These verbs should be classified as metaphorical (communicated information as being linguistically packaged and exchanged between interlocutors)
Verbs of creation		*bake, make, build, cook, sew, knit, toss* (when a salad results), *fix* (when a meal results), *pour* (when a drink results)	
Verbs of obtaining		*get, buy, find, steal, order, win, earn, grab*	
Verbs of refusal		*refuse, deny*	Goldberg's addition

Table 9. Verb subclasses that goes along with the ditransitive constructions that Pinker proposes (Goldberg 1995: 126)

The second column in Table 9 shows which verbs Pinker (1989) and Goldberg (1995) found to occur with the DC. In the first column these verbs are categorized and labeled based on their common semantics. Since the subclasses above helps us capture the central sense of the verbs, I will refer to the semantic subclass of the verbs in Table 9 when examining the semantics of the verbs.

'Central sense' in this study means the sense of the verb which most people may agree is prototypical regardless of the constructions in which the verb occurs. This corresponds to the meaning of the lexical schema. In order to identify the central sense, I refer to *Collins Cobuild English Language Dictionary* (Sinclair et. al. 1987) (CCELD) and *Collins Cobuild English Language Dictionary for Advanced Learners* (2001, an electronic version) (CCED_AL). The multiple senses of one entry in these dictionaries are organized based on frequency, independence of meaning (the meaning of a word in isolation regardless of its environment), and concreteness. '[I]n this dictionary the first sense is a common one and a central one; also an independent one and if possible it is concrete' (CCELD, xix). For the central sense of a verb, therefore, I will refer to the senses that appear early in the entry. Based on these central senses of the verbs, identified by the dictionary, I will be able to discuss how compatible the verbs are with the DC and what semantic properties make the verbs to be coerced.

3.2.1. Criteria for deciding the degree of semantic compatibility with the DC

Gropen, Pinker, Hollander, Goldberg, and Wilson (1989) suggest two criteria that determines which verbs can occur with the DC and which cannot. The first one is a morpho-phonemic criterion that 'the verbs must belong to the native-stem class rather than to the Latinate class' (Gropen, et al. 1989: 207) in order for them to occur in the DC. For example, they observed that even in the same verb subclasses, *build* is fine to occur in the DC, while *construct* is not. People can distinguish Latinate verbs and native verbs because morphologically, Latinate words contain morphemes such as *per-, con, -mit*, and *–sume* and native verbs are phonologically monosyllabic or polysyllabic with initial stress. They claimed that with this morpho-phonemic criterion, people know whether or not the verb can occur in the DC even if people do not know the etymology. However, Pinker (1989: 111-123) showed that there are exceptions of this criterion: *bequeath, deny*, and *recommend*, for example, can occur in the DC. Also, Gropen, et al. (1989) also admit that people seem to be willing to use or accept verbs that are unlikely to have been heard in the DC (Gropen, et al. 1989: 208). It is possible that semantics of the verbs can override the morpho-phonemic restriction. I will test this possibility through experiments in Chapter 5.

The second criterion is the semantic criterion that 'the referent of the first object must be the prospective possessor of the referent of the second object' (Gropen, et al. 1989: 207).

(48) *John *washed* Mary a car. (Gropen, et al. 1989: 207)

For example, they claim that (48) is not acceptable because Mary is only a beneficiary of the result of washing the car but not a possessor of the car (Gropen, et al. 1989: 207).

The criterion results in a dichotomous distinction, whether a verb occurs in the DC or not: only the verbs that satisfy the criterion of "prospective possessor" can occur in the DC. This semantic criterion does not capture a gradient nature of the compatibility that I showed in 1.1. Actually, (48) could be acceptable for some people even though there is no transfer of possession because it is not very different from (44) in that the Recipient was benefited as the result of Agent's action.

Therefore, the morpho-phonemic and semantic criteria that Gropen, et al. (1989) propose are not sufficient to explain the gradient semantic compatibility with the DC.

Instead, in this chapter, I will propose semantic criteria that will allow us to predict which verbs are more compatible with the DC and which are less.

As stated in 3.1, the meaning of the DC is 'transfer of a Patient from an Agent to a Recipient' if the conditions for the semantic properties of the arguments are assumed to be met. In order for a verb to be semantically more compatible with the construction, the verb meaning should overlap with the constructional meaning as much as possible. In other words, it should involve 'transfer of the patient from the Agent to the recipient' to a greater extent. If a verb involves transfer to a less degree, the verb will be less compatible with the construction.

In analyzing the degree to which various verbs involve transfer of possession, several criteria of semantic properties emerge as important.

The first criterion is 'how many salient participants are involved in the event that the verb designates.' In the event of transfer of possession, three participants are salient: the person who transfers, the entity that is transferred, and the person who receives the entity. Note that the third participant is a Recipient, not a Location, because in order for transfer of possession to occur, the third participant should be a person (or should be conceptualized as a person) as I discussed thorough the example (41) in 3.1. If the number of participants salient in the event is less than three, the verb will be less compatible with the transferring event. For example, in the event of *make*, there are typically two salient participants: a person who makes and an object which is made.[30] When there is no Recipient to receive the entity, transfer itself cannot occur at all. Moreover, if there is one participant, it is even less compatible with the DC. For example, the verb *sleep* involves only one participant in the sleeping event. Since there is no person to receive an entity and no entity to be transferred, the transfer

[30] It is possible to imagine that there might be the third person who will receive the object made by the Agent, but this person is not salient in the event of *make*.

cannot happen. Therefore, *sleep* is the least compatible with the DC.

The second criterion is whether or not the action designated by the verb makes the Patient transferrable or not, if the Patient is to be transferred. The most prototypical scenario of the transferring event is that the transferred entity is not damaged or, more generally speaking, negatively affected by any other actions before the entity leaves Agent's dominion, or sphere of control (Langacker 2008: 242). In other words, we expect that the Patient is transferred from the Agent's dominion to the Recipient's dominion intact. Recall that the semantics of the DC has a benefactive meaning as stated in 3.1. When the transferred entity is damaged or negatively affected, the Recipient is less likely to be benefited. Therefore, if a verb describes an event where the Agent damages or negatively affects an entity, the verb is less compatible with the meaning of the DC.

One of the examples that are compatible with the DC is *mail*. Before an entity is mailed, it has been in the dominion of the Agent and it is not damaged or negatively affected. Once it is transferred from the Agent to the Recipient, we assume that the entity is transferred to the Recipient intact.

On the other hand, *kill* is not not very compatible with the DC. This verb describes a scenario where an entity is damaged when it is in the Agent dominion. Since we do not expect that the transferred entity is damaged, *kill* is not very compatible with the event of transfer, and thus, not compatible with the DC.

Another scenario where transfer is impossible is that even though an entity is not damaged by the action denoted by the verb, the Patient itself is not a transferrable entity.

Let us discuss the difference between (49a) and (49b).

(49) a. ?John *opened* me the can.

b. ??John *opened* me the door.

Both (49a) and (49b) are not perfectly natural because *open* is not compatible with the DC according to the first criterion. The central meaning of *open*, outside the DC, does not inherently involve the meaning of transfer at all. This verb usually occurs in a monotransitive sentence like *John opened the door* where there are two participants: the one who opens and the thing which is opened. Moreover, there could be only one participant in the event scene as in an intransitive sentence: the thing that opens as in *the door opens automatically*. Therefore, *open* is not very compatible with the DC.

Nevertheless, *open* can occur in the DC, according to a few native speakers of English[31] that I consulted. They said that (49a) sounded better than (49b). The reason why (49a) sounded better than (49b) is that the resulting state of opening action is different: we can transfer an opened can but we cannot transfer an opened door physically or we cannot transfer the ownership of the door. The difference between the two sentences in (49) suggests that the condition of the object resulting from the action designated by the verb should be 'transferrable' in order for the verb to occur in the DC more naturally.

This difference between the examples in (49) can be captured only when the semantic properties of the Patient are considered. This suggests that we also need to consider the semantic properties of the Patient as well in order to discuss the semantic

[31] I acknowledge Jennifer Hoecker, Chelsea McCracken, Ann Olivo, and Emilie Chu for giving me feedback about English sentences.

compatibility. However, as I stated earlier in 3.1, I will consider only the verb meaning in this chapter in order to discuss the semantic compatibility between a verb and a construction and I will assume that the semantic properties of the arguments are satisfied (see p.125). If we assume that the Patient is an entity that can be transferred, the second scenario of impossible transfer, that is, the Patient itself is not transferrable, is out of scope of the discussion of the semantic compatibility. Thus, examples like (49b) are excluded from the discussion of the semantic compatibility because we usually do not think that a door itself or its ownership can be transferred. If the Patient is a transferrable entity like *a can* in (49a), the verb *open* meets the second criterion that the condition of the Patient resulting from the action designated by the verb should be transferrable.

Consequently, as the second criterion for deciding the degree of semantic compatibility, I will consider the first scenario of impossible transfer in which the action designated by the verb is not damaged or negatively affected.[32]

The second criterion that will be useful when discussing the interpretation of the coerced sentences: I predict that if the Patient remains transferable as a result of the action designated by the verb, the verb in the DC will be coerced to have the meaning of physical or metaphorical transfer. The verb *open* is not very semantically compatible with the DC, but (49a) can be interpreted as 'John opened the can for me and gave it to me.' This interpretation has both the meaning of transfer of possession

---

[32] Nevertheless, as we will see later through the results from the corpus analysis in 4.3.2.7 and the experiments in Chapter 5, the semantics of the Patient should be considered eventually in order to discuss when coercion is more likely to occur and when coercion is easier to process.

and the whole action is viewed as benefactive.

On the other hand, a verb that causes the Patient impossible to be transferred will not be natural to occur in the DC and it is harder to be coerced. For example, *kill* is not very compatible with the DC as *I killed him a rat* does not seem to be very natural: the rat is not transferrable because it is damaged by the action of killing and the Recipient is not likely to receive the rat. (Moreover, it is not likely that the Recipient wants to receive the rat.)

Nevertheless, even though it is not very natural, *I killed him a rat* can be used through coercion in the meaning of benefactive: 'I killed a rat for his benefit.' I showed in 3.1 that the meaning of transfer is strongly implied in the DC while the benefactive meaning is implicit. It seems that, in order for a verb that designates an action that makes the Patient impossible to be transferred, to be used in the DC, the salient meaning of transfer should be suppressed while implicit benefactive meaning should become salient. Therefore, I conclude that coercion is harder if the Patient becomes impossible to be transferred due to the action of the verb and the transfer meaning should be suppressed.

In sum, I propose the two criteria, for deciding the degree of semantic compatibility with the DC: the number of participants in the event scene of the verbs and the possibility that the Patient is transferrable as a result of the action designated by the verb. If the number of the participants in the even scene of the verb is closer to three, and if the Patient is transferable as a result of the action of the verb, the verb is semantically more compatible with the DC.

Of the two criteria, I do not claim that either one is more important. However, it is true that the first criterion is relatively more conspicuous because the number of the salient participants is strongly related with the number of syntactic arguments in a construction. When examining the central meaning of each verb, the number of syntactic arguments of a construction which the verb is frequently associated with will tell the number of participants typically involved in the event. Because the number of syntactic arguments is easily observable in the syntactic frame, the first criterion functions importantly to decide how semantically compatible the verb is with the DC.

On the other hand, the second criterion is not very noticeable at a glance because we have to examine the specific meaning of the verb more closely. However, this criterion is still important when we discuss why some verbs are relatively compatible with the DC while others are not even though they equally do not meet the first criterion. For example, the verbs of obtaining such as *cook* are not as perfectly compatible with the DC as *give*, but they can still occur in the DC according to Table 9. On the other hand, *kill* is much less compatible with the DC. Both *cook* and *kill* have only two salient participants in the event scene. In the case of *cook*, an entity comes into the Agent's dominion when the Agent creates an entity by cooking it. This verb does not imply any actions of damage or negative influence on the entity until the entity leaves the dominion of the Agent to the dominion of the Patient. Therefore, when it occurs in the DC as in *John cooked her the dinner*, the dinner cooked by John can be transferred to the Recipient *her*. However, in the event of *kill*, the entity in the dominion of the Agent is damaged. Since a damaged entity is not expected to be transferred to another person, *kill* is less compatible with the DC than *cook*.

Based on the two criteria of the degree of transfer, I present a scale of five degrees along which the transfer is involved. The verbs which will be presented first in 3.2.2.1 can be seen to involve transfer of possession most, so they are the most compatible with the DC, while the verbs which will be presented last in 3.2.2.5 involve transfer of possession least so they are the least compatible with the DC. Note that I follow Pinker's labels (1989) of the verb subclasses when I discuss the semantics of the verbs and I also add some other verb subclasses that are not shown in Table 9.

3.2.2. Verbs involving different degrees of transfer

3.2.2.1. Verbs of inherent transfer

In the event scene which is designated by the "verbs of inherent transfer," there are three arguments: an Agent that causes transfer, a Patient that is transferred, and a Recipient that receives the transferred Patient. The Patient is physically transferred from the Agent to the recipient as in (50a) and (51). However, transfer can occur in an abstract domain: transfer of ownership is one of the examples as I stated in 3.1. Another example is the case where the participants are abstract as in (50b). When *an opportunity* is understood as if it is a concrete entity, it can be transferred.

(50) Verbs that inherently signify acts of giving: *give, pass, feed*

a. They *gave* us and T-shirts and stickers. (CCED_AL)

b. if you did decide on something and wanted it *give* me an opportunity to post Connie's parcel. (BNC_KE6)

(51) Verbs of sending: *send, ship*

- Myra Cunningham *sent* me a note thanking me for dinner. (CCED_AL)

Verbs that designate an event that involves systematic metaphors also belong to this category, as in 'telling a story' via the conceptual metaphor "understanding communicated information as being linguistically packaged and exchanged between interlocutors" (Goldberg 1995).

(52) Verbs of communicated message: *tell, teach*

- Will you *tell* me a story? (CCED_AL)

(53) Verbs of instrument of communication: *email, fax*

- Did you *fax* him a reply? (CCED_AL)

The difference of the verbs of instruments of communication in (53) from the communication verbs in (52) above is that the verbs in (53) involve metonymy. For example, *fax* is originally an instrument of communication. When it is used as a verb, via the metonymy 'OBJECT FOR AN ACTION IN WHICH THE OBJECT IS INVOLVED' (Ruiz de Mendoza Ibáñez and Hernández 2001), the instrument 'fax' represent 'the action of giving information by using a fax machine.'

If verbs imply future transfer, they also belong to the "verbs of inherent transfer" because the person who will receive the patient is already assumed in the event scene designated by the verb as in (54).

(54) Verbs of future having: *bequeath, assign*

- He *assigned* her all his land in Ireland. (CCED_AL)

The only difference of the 'future having verbs' from the verbs mentioned earlier such as *give, send, tell*, and *fax* is that the Patient will be transferred from the Agent to the Recipient in the future.

The following verbs in (55) can also be categorized in the "inherent transfer" verbs.

(55) Verbs of continuous causation of accompanied motion in a deictically specified direction (i.e. "deictic verbs" in the present study): *take, bring*

a. The children could *bring* the comics… (CCELD)

b. My father *brought* home a book for me. (CCED_AL)

c. The stewardess kindly *brought* me a blanket. (CCED_AL)

As in (55a), *bring* can occurs in a simple transitive sentence with only two participants, which are an Agent and a Patient. The location or the person to which the comics are transferred is not specified but only the event in which the children came with the comics is salient. Even though not realized linguistically, the Goal to which the comics goes is backgrounded in the event of *bring*. If someone says *I'll bring the cake with me on Friday*, it is assumed that the cake will be brought to the place where the Agent goes to. If (55a) is spoken without any context given, the listener is likely to ask the location where the comics are transferred.

Therefore, *bring* often occurs with all the three participants linguistically realized as in (55b) and (55c). In addition to the Agent and the Patient, there is the third participant in the event, which is either a Location or a Recipient and this third participant is the goal to which the Patient is transferred. In the event scene of *bring* in (55b) and (55c), there is a Location or Recipient to which the Patient is transferred. Transfer occurs between the Agent and this third participant. In other words, since the deictic verbs have three participants in the event scene, even though not necessarily realized linguistically, they are compatible with the DC.

In addition, the verbs in this category do not specify any action that negatively affects or damages the Patient. The Patient can be transferred to the Recipient intact.

In conclusion, verbs of inherent transfer, sending verbs, communication verbs,

verbs of instrument of communication, verbs of future having, and deictic caused motion verbs would be the most compatible with the DC. These verbs inherently carry the meaning that an Agent transfers a patient to a recipient. It is possible that one of the participants is not linguistically realized in a sentence like (55a), but even this participant exists in the background of the event scene.

3.2.2.2. Verbs of possible transfer

In the central meaning of the verbs in this category, there are two participants, an Agent and a Patient. The action designated by these verbs does not cause the Patient to be damaged or negatively affected. Therefore, if this verb occurs in the DC, the Patient can be transferred.

Since there are two participants in the event scene, these verbs do not satisfy the first criterion of "three salient participants," discussed above. Therefore, these verbs are less compatible with the DC than the verbs of inherent transfer.

First, the verbs of ballistic motion do not require a specific point to which the Patient is transferred as in (56a).

(56) Verbs that instantaneous causation of ballistic motion: *throw, shot*

a. He *threw* the book in the air. (CCELD)

b. Roger picked up a stone, aimed, and *threw* it at Henry. (CCELD)

c. He *threw* Brian a rope. (CCED_AL)

As in (56a), *throw* often occurs in a monotransitive construction with an adverbial phrase, but this phrase does not necessarily specify a location or a person to which the Patient goes. Also, these verbs do not necessarily specify a person who receives the Patient. Rather, *throw* designates a quick action of moving a hand or an arm to release an object.

The action of *throw* can be an action that has an aim as in (56b) and (56c), but it is different from the verbs of inherent transfer in that the verbs of inherent transfer designate an event in which the third participant's receiving action is intended while *throw* designates an event where this intention is not inherent. For example, in (56b), the Agent does not throw the stone specifically in order for the person to receive it and the person does not knowingly receive it. *Roger*, the Agent, threw the stone in order to hit Henry and Henry may have been hit by the stone. In other words, Henry is not a Recipient. Also, compared with (56a), the verbs of inherent transfer cannot be used if any specific goal is not assumed as in (57).

(57) *He *gave/passed/sent/brought/bequeathed* the book in the air.

Therefore, the verbs of ballistic motion are less compatible with the DC than the verbs of inherent transfer because the third participant is not salient in the event scene and even if there are three of them, the third participant does not have to be a Recipient and the action designated by the verbs does not have to indicate an intention of transfer.

Nevertheless, *throw* can occur in the DC, as in (56c). When it occurs in the DC, the expression means that the Agent throws a rope so the Recipient can receive it. (56c) is different from *He threw a rope at Brian*, which can mean 'he threw the rope in order to hit Brian.' Since *throw* does not have the meaning of 'intended transfer to the Recipient' inherently, this meaning of receiving comes from the constructional meaning of the DC which inherently assumes a Recipient. Therefore, I claim that when the verbs of ballistic motion occur in the DC, it is coerced to designate a Recipient.

Though the verbs of ballistic motion do not meet the first criterion that there are three salient participants in the event scene, they qualify the second criterion that the condition of the Patient resulting from the action designated by the verb should be transferable. Since the action of *throw* describes the manner of how the Agent causes the Patient to move from the Agent, the entity is not damaged or negatively affected only by being thrown and if the entity can be thrown, it is transferable. Therefore, if there is a Recipient, he can receive the Patient and transfer is successful.

The verbs of obtaining and creation in (58) and (59) also have two participants in the event scene but the Patient is not negatively affected by the action designated by the verb so it is transferable.

(58) Verbs of obtaining: *buy, win, earn*

a. He could afford to *buy* a house. (CCED_AL, modified)

b. I'd like to *buy* him lunch. (CCED_AL)

(59) Verbs of creation: *cook, bake, sew*

a. I have to go and *cook* the dinner. (CCED_AL)

b. We'll *cook* them a nice Italian meal. (CCED_AL)

In the central meaning of these verbs, there are two salient participants, an Agent and a Patient. The action designated by the verbs is causing a certain entity to come into the dominion of the Agent.

In (58a) and (59a), there is no third participant as a Recipient in the event scene. In the events of buying and cooking, the Agent causes the Patient to enter his/her own dominion by obtaining or creating. Also, in the event scene of *buy* or *cook*, it is not implied that the Patient is damaged or negatively affected once the Patient enters the Agent's dominion. Therefore, the Patient is intact, and it could be transferred to another person later if it ever occurs in the DC as in (58b) and (59b).

In these examples of the DC, (58b) and (59b), the Patient is transferred to the Recipient. In the case of obtaining verbs, the entity has originally belonged to neither the Agent nor to the Recipient, but to another person that is not salient in the event scene. Through the action designated by the obtaining verb like *buy*, the Agent causes the Patient to be under control of the Agent, and the Agent causes the Patient to be transferred to the Recipient. For example in (58b), *lunch* may be cooked by another person backgrounded in the event scene, and *I*, the Agent, brings the lunch into his/her control by the action of 'buying' it. Then the lunch is transferred to *him*, the Recipient, because the Agent causes the transfer.

Also, in the case of creation verbs, the Agent makes the Patient in control of the Agent by creating it and he/she causes this created Patient to be transferred to the Recipient. For example, in (59b) we cook a nice meal and transfer it to them.

Consequently, when the obtaining verbs and creation verbs, which do not have the meaning of transfer prototypically, occur in the DC, coercion occurs in the following way: the central sense of the verbs (i.e. to obtain or to create something) provides the meaning how the Patient comes into the Agent's dominion in order for transfer to occur. The DC provides the meaning of transfer.

In addition to the meaning of transfer, (58b) and (59b) carry a benefactive meaning via the conceptual metaphor of 'actions which are performed for the benefit of a person as objects which are transferred to that person' (Goldberg 1995: 150). The action of buying and cooking is performed for benefit of the Recipient. The benefactive interpretation is possible due to the transfer meaning of the DC, because the transfer is performed so that the Recipient gains something. Therefore, the obtaining and creation verbs are coerced into the meaning of an event prior to transfer and a benefactive action.

I claim that the verbs in this type are less compatible with the DC than the verbs in 3.2.2.1 because they do not inherently specify transfer because there is no salient third participant, the Recipient. However, they are more compatible with the DC than the verbs discussed in 3.2.2.4 because the Patient is intact so it can be transferred.

3.2.2.3. Verbs of prevented transfer

Like the verbs in 3.2.2.2, in the central sense of the verbs of prevented transfer, the Recipient may not be required. In the event scene of *refuse*, there are two participants: the Agent who refuses and the Patient which is refused. The Patient can be expressed as a *to*-infinitive clause as in (60).

(60) Verbs of refusal: *refuse, deny*

- The French *refused* to consider the proposal. (CCELD)

In (60), the verb *refuse* means that the Agent, *the French,* deliberately chooses not to do the action described in the *to*-infinitive clause. The Patient is not a concrete entity, so it is not a prototypical Patient. Rather, what is refused is an action, *to consider the proposal*, but we can conceptualize it as a Patient. Therefore, we can say that there are two salient participants in the event of *refuse*.

In the event scene of (60), it is possible that there is another person who has made the proposal and wanted the French to consider the proposal. However, this person's proposal is refused by the Agent. This person could be the Recipient of the communicated message of refusal. However, he is backgrounded in the event scenario, so it is not realized as a Recipient in the syntactic form.

The backgrounded Recipient is realized as an indirect object when *refuse* occurs in the DC as in (61).

(61) The USA *refused* John a visa. (CCED_AL)

In (61), what is refused is not simply *a visa* but the action 'to give John a visa' because the DC adds the meaning of transfer. In other words, *refuse* is coerced into the meaning of 'not giving a Recipient a Patient desired by the Recipient.'

John may have requested to receive the visa as a Recipient, so we can say that there might have been an attempt for transfer, but because the central sense of *refuse* which is, 'not choose to do an action desired by another,' transfer fails. Even if there are an Agent, a Patient, and a prospective Recipient, transfer does not occur and there is no implication that transfer will occur in the future.

Because the Recipient is not required in the event scene, it does not meet the first criterion. The second criterion is not satisfied because transfer, which could have occurred, becomes impossible due to the refusing action. Therefore, I claim that the verbs in this category are less compatible than the verbs in 3.2.2.1 and 3.2.2.2.

3.2.2.4. Verbs of impossible transfer

Pinker (1989) does not mention the verbs that will be investigated in this category because these verbs do not seem to occur in the DC. In the present study, I also examine if people can coerce expressions where the DC and the verbs in (62) co-occur.

(62) Verbs that designate an action which causes the Patient not transferable: *kill, break, cut*

In the event scene which is designated by the verbs in this category, there are two salient participants: an Agent and a Patient, but not necessarily a Recipient. Thus, they do not meet the first criterion of three salient participants. In addition, unlike the verbs in 3.2.2.1, 3.2.2.2, and 3.2.2.3, the action designated by the verbs in (62) results in the damage of the patient. As is mentioned in 3.2.1, we generally expect that we transfer an entity intact to the Recipient so that the Recipient can be benefited. However, by the action of killing, breaking, and cutting, the Patient becomes impossible to be transferred because if a thing is broken into many pieces, the entity becomes useless. Therefore, even if this verb occurs in the DC, the Patient cannot be transferred to another person after the action is performed.

Consequently, these verbs are less compatible with the DC than the verb in 3.2.2.1, 3.2.2.2, and 3.2.2.3 in that there are only two salient participants: an Agent and a Patient. They also do not meet the second criterion because the condition of the Patient is not transferable because it is damaged or negatively affected by the action designated by the verb.

However, we can still find expressions where these verbs are used in the DC as in (63).

(63) *Slay* me a dragon. (Goldberg 1995: 150)

Since a damaged entity is not desirable to be transferred, *slay*, in which the action damages an entity, is not compatible with the DC. Nevertheless, the verbs can be coerced into benefactive meaning due to the benefactive meaning of the DC. Via the conceptual metaphor of 'actions which are performed for the benefit of a person as objects which are transferred to that person' (Goldberg 1995: 150), (63) is interpreted as 'Slay a dragon for my benefit.' Goldberg adds that the degree of the acceptability judgments varies depending on the dialect (Goldberg 1995: 150). Therefore, in the corpus analysis and experiments, I will test if the verbs that may belong to (62) are used in the DC and try to find out the difficulty of coercion and how the co-occurrences of the verbs and the DC may be interpreted.

Note that if the verbs of damaging an entity are coerced into the meaning of 'creation,' they can be used in the DC in the meaning of physical transfer as well as the benefactive meaning.

(64) Mark *killed* Jane a buffalo.

For example, we can interpret (64) as 'Mark killed a buffalo for her benefit (because she wanted it to be killed).' We can also interpret it as 'Jane wanted buffalo hide, so Mark killed a buffalo and gave her the body of the buffalo.' In this case, the Agent 'creates the body of the buffalo by the action of killing.' I will discuss more about the interpretation of the co-occurrence of the DC and verbs of impossible transfer with the experimental data in Chapter 5.

Consequently, I claim that the verbs such as *kill* are less compatible than the verbs in the above three categories because there are only two participants, thus transfer is not likely occur if not in the DC, and the entity is damaged or negatively affected, so transfer of this entity is not expected. In this case, only the benefactive meaning is possible. Even though the entity can be physically transferred, we need to interpret the verb in the meaning of ‘creation.’ In conclusion, the verbs of impossible transfer are less compatible with the DC, thus the verb and the DC do not co-occur in the corpus frequently, and their co-occurrence will be processed slowly for greater coercion.

3.2.2.5. Verbs of events internal to the Agent

In the event scene of some verbs in this category, there are two arguments, an Agent and a Patient. Semantically, however, the Patient of these verbs is not physically affected by the action designated by the action, (thus, they are called Theme rather than Patient), but it is treated like a Patient syntactically.

The examples are emotion verbs and cognition verbs in (65) and (66).

(65) Verbs of cognition: *think, know*

- I don’t *know* the name of the place. (CCED_AL)

(66) Verbs of emotion: *like, regret*

- He *likes* baseball. (CCED_AL)

In (65) and (66), the Patients, *the name of the place* and *baseball*, are not affected by the action designated by the verb, because the events such as knowing and liking occur in the Agent’s mind. In other words, they are events occurring internally in the Agent’s dominion. Even though there are two participants, the event occurring in one’s mind cannot cause the other thing to be transferred physically or it cannot cause the ownership to be transferred. Also, no one can be benefited by the event occurring in one’s mind. In other words, the second criterion, that the condition of the Patient resulting from the action designated by the verb, cannot be considered at all.

In addition, in the event scene of some verbs, there is only one argument as in the case of intransitive verbs in (67) and (68). In both cases, the action does not affect the world outside of the Agent’s dominion.

(67) Intransitive verbs_stative: *sleep, stay*

(68) Intransitive verbs_ motion: *walk, run*

Since there is only one argument, it is even harder to think that transfer occurs than in the cases of the verbs in 3.2.2.4, which means that the first criterion is not satisfied. Since there is no entity to obtain, create, or damage, the second criterion is not even applicable.

I claim that the verbs in (65)-(68) are so incompatible that they are virtually impossible to be coerced. Therefore, the degree of the involvement of transfer is the lowest.

3.2.3. Summary: the verbs of different degrees of transfer involvement

Table 10 summarizes the verb subclasses which are categorized based on how much transfer is involved in the action designated by the verbs.

Category based on the degree of transfer	Verb subclasses	Number of Participants			Possibility of Transfer
		3	2	1	
Verbs of inherent transfer	Inherently signifying giving	Y			
	Communication	Y			
	Instrument of	Y			

	Communication				
	Future having	Y			
	Sending	Y			
	Deictic	Y			
Verbs of possible transfer	Ballistic motion		Y		The Patient is intact, potentially transferable.
	Creation		Y		
	Obtaining		Y		
Verbs of prevented transfer	Refusal		Y		Attempted but failed
Verbs of impossible transfer	Damaging		Y		impossible
Verbs of events internal to the Agent	Emotion/cognition		Y		impossible
	Intransitive			Y	impossible

Table 10. Summary of verbs in different degrees of transfer involvement

The criteria for deciding the degree of transfer involved in their verbal events (outside the DC) are the number of participants in the event scene and the possibility of Patient's transfer. The most compatible verbs have three participants in the event scene, and the less participants a verb has, the less semantically compatible it is with the DC. If the Patient is less likely to be transferable because it is damaged/negatively affected or transfer fails due to the action designated by the verb, the verbs are less compatible with the DC.

The verbs of inherent transfer include verbs inherently signifying giving, verbs of communication, verbs of instrument of communication, verbs of future having, sending verbs, and deictic verbs. There are an Agent, a Patient, and a Recipient in the event and transfer occurs successfully between the Agent and the Recipient. Therefore, these verbs are the most compatible with the DC.

The second most compatible verbs are the verbs in which transfer is not inherent but potentially possible. These verbs, such as verbs of ballistic motion, verbs of creation, and verbs of obtaining, have only an Agent and a Patient in the event scene. Since there is no one receiving the Patient, transfer is not inherent to the verbal event. Because these verbs are not perfectly compatible with the DC, if it occurs in the DC, some degree of coercion is required to have the meaning of transfer. The action designated by the verb is understood as a prior action of transfer (e.g. cook and transfer / buy and transfer). When the verb occurs in the DC, the Patient is not damaged by the action designated by the verb, and thus, it can be transferred to the Recipient. At the same time, it has the benefactive meaning that the action is performed for the benefit of the Recipient.

The next most compatible verbs are the verbs of prevented transfer. Because there is an Agent and a Patient, there are only two participants. There could be the third participant who desires the action designated by the Patient, but this participant is only implicit. Therefore, transfer is not inherently designated by these verbs. When coercion occurs, the third participant who desires the Patient is realized as a Recipient. Due to the meaning of the DC, at least the meaning of transfer is involved in that the Recipient wants to receive the Patient. However, transfer fails because of the refusing action designated by the verb.

The next most compatible verbs are the verbs where transfer is impossible such as verbs of damaging. Since there are only two participants in the event scene, transfer is not inherent. In addition, the Patient is damaged due to the action designated by the verb, it cannot be transferred. Therefore, it is not very compatible with the DC. When it occurs in the DC, it is likely to be coerced to have a benefactive meaning.

The verbs least compatible with the DC are the verbs of emotion and cognition and intransitive verbs. These verbs have only one participant and even if they are construed to have two, transfer is impossible since the event itself does not affect other participants outside of the Agent. These verbs are very unlikely to be coerced.

3.3. More verbs to be examined

In addition to the verbs in 3.2, there are other verbs that deserve further investigation. Goldberg (1995: 128) presents some classes of verbs that should not be perfectly compatible with the DC in (69), following Pinker (1989)'s claim.

(69) Verbs that do not occur with the DC (Goldberg 1995: 128)

a. Verbs of fulfilling (X gives something to Y that Y deserves, needs, or is worthy of): *present, credit, entrust/trust, supply.* To these, Goldberg also adds *concede, furnish, donate*

b. Verbs of continuous causation of accompanied motion in some manner: *pull, carry, push, schlep, lift, lower, haul*

c. Verbs of manner of speaking: *shout, scream, murmur, whisper, yodel*

d. Verbs of proposition and propositional attitude: *say, assert, question, claim, doubt*

e. Verbs of choosing: *choose, pick, select, favor, indicate*

The verbs in (69a) have three participants in the event scene, an Agent, a Patient, and a Recipient. For example, there is a person who presents, a thing to be presented, and a person who receives the thing presented. However, these verbs are observed not to be used with the DC. The semantics of these verbs are slightly different from the verbs inherently signifying giving in (50) in 3.2.2.1. First, as Pinker (1989:111) pointed out, the Recipient in (69a) is a person who needs or deserves the Patient and the Patient does not necessarily belong to the Agent before transfer occurs. Second, in addition to this, I add that the Agent is often considered to be a person or an organization who has the authority to give the Patient or an institution (e.g. banks, foundations, and governments).

Even though Pinker (1989) did not explicitly explain the reason why these verbs are not used in the DC, we can consider Pinker (1989)'s proposal of morpho-phonemic criterion. It is possible that these verbs do not occur in the DC because the verbs in (69a) are Latinate verbs. Also, according to Pinker (1989), the morpho-phonemic criterion may be correlated with the verb semantics. Mostly, Latinate verbs have more specific meaning than native verbs (Pinker, 1989:119) and the relation between the Agent and the Patient are relatively indirect. In the cases of the verbs in (69a), the relationship of the Agent and the Recipient is rather indirect: when the Agent presents an award to the Recipient, the Agent is often an institution or an individual representing the institution, rather than the Agent personally gives an award to the Recipient. If the possibility that a verb can be used in the DC is motivated by the general notion of "Agent causes Recipient to have Patient" and it assumes direct relation between the Agent and the Recipient, the distinction between the verbs like *give, send*, and *hand* and the verbs like *present, provide*, and *donate* may be correlated with the semantics of the verbs. Consequently, these verbs are predicted not to occur in the DC not only because of its morpho-phonemic criterion but also because of the verb semantics denoting the indirect relations between the Agent and the Recipient.

The verbs in (69b) are comparable with the verbs of ballistic motion such as *throw*. Although not perfectly compatible, *throw* is somewhat compatible with the DC as in (56). When *throw* describes an action of the Agent at the moment of the Patient leaves the Agent's hand, the verbs in (69b) describes continuous causation of the movement forced by the Agent. Bresnan and Nikitina (2008) conjectured that because the Agent holds and clings to an entity continuously as in the case of *carry*, it looks like a transfer of possession is not occurring. Therefore, the verb is predicted not to occur in the DC in the corpus and processed very slowy.

The verbs in (69c) and (69d) are comparable with the verbs of communication such as *tell*. Note that the verbs of manner of speech such as *whisper* do not always require a person who listens and a content to be informed because they “describe the physical characteristics of a sound” rather than “an intended act of communication by speech” (Zwicky 1971: 225-226, as cited by Bresnan and Nikitina 2009). Therefore, these verbs are often used as intransitive. The verbs in (69d) also do not require a listener as in *He claimed that it was all a conspiracy against him* (CCED_AL). The content claimed is fully expressed in *that* clausal complement whereas the person who listens to the claim is not specified. Therefore, these verbs are predicted not to occur in the DC in the corpus and processed very slowly.

Last, verbs of choosing in (69e) are reported not to occur with the DC. They are comparable with the verbs of creation and obtaining in that by taking the action designated by the verbs of choosing, the Agent makes the Patient enter his dominion of control and they are not damaged. However, Pinker claims that these verbs do not occur with the DC but there is no explanation why they do not.

Finally, even some intransitive verbs may occur with the DC. As *sneeze* can occur in the caused-motion construction, it may be able to occur with the DC. Even though it may belong to the ‘verbs of events internal to the Agent,’ the event of *sneeze* involves force dynamics of physical motion and causation (Talmy 2000). With the force caused by the sneezing act, an entity influenced by the sneezing action can be transferred to another person. If such sentences as *I sneezed him the napkin* is possible, there may be more specific constraints for coercion such as the involvement of force dynamics.

Even though the verbs mentioned in this section are claimed not to occur with the DC, whether or not these verbs are actually used together with the DC should be examined through corpus analysis and experiments. If they occur less frequently with the DC and harder to be processed than their comparable verbs, we can discuss the semantic restrictions of coercion in more detail.

3.4. Conclusion

In this chapter, I examined which verbs can occur with the DC and the semantic compatibility between these verbs and the DC. The semantic analysis shows that the semantic compatibility is not binary, i.e. divisible into "compatible" and "incompatible." Rather, there are different degrees of compatibility. Depending on the degree of compatibility, the likelihood that the verb can occur with the DC is also gradient. Since the degree of semantic compatibility is different depending on the verb semantics, the difficulty of coercing the verb meaning through contextual elements is also different, depending on the verb semantics. In other words, coercion is not a binary concept, either. Also, different verbs are coerced in different ways. Some verb meanings are interpreted as a prior event to transfer while others are interpreted as the means of transfer. Some verbs are coerced to involve transfer, and some verbs are coerced to have only a benefactive meaning. Moreover, different verbs involve various kinds of metaphors when coercion occurs.

Based on the usage-based model, I claim that the observations on coercion from the analysis of semantic compatibility will be correlated with the usage as well. If a particular construction and a verb are semantically compatible, they will be activated together frequently. If the verb and the construction are activated together often, it is likely that they will be used together frequently in actual speech. Also, if the verb and the construction are semantically compatible, people do not have to coerce the verb into the constructional meaning greatly. Therefore, the co-occurrence of the verb and the construction will be easy to be processed.

On the other hand, if a verb is less compatible with the construction, they will not be activated together very often. If a speaker has reason to use the less compatible verb with the construction, he or she will need to coerce it and take more processing time. The less compatible verb and construction will be used together less frequently.

The next chapter deals with a corpus study which reveals frequency patterns in which verbs and a particular construction are used together. I will show that the semantic compatibility between the verb and the DC is correlated with the frequency pattern, and examine how incompatibility can be resolved when the verb and the construction are used not very frequently.

4. Corpus Analysis of the Ditransitive Construction and Its Co-occurring Verbs

In the previous chapter, I examined the semantics of the ditransitive construction (DC) and various verbs that may or may not occur with the construction. Based on the usage-based model (Langacker 1988 and elsewhere, Kemmer and Barlow 2000, and Kemmer 2005, 2008), we can relate this linguistic knowledge of semantic compatibility of the verbs and the construction with their frequency in actual use. If a verb is semantically compatible with the construction, speakers will use the verb with the construction frequently. If a verb is less compatible with the construction, the verb and the construction will be used less frequently.

If a verb which is not very compatible with the construction is actually used with the construction, this means that some cognitive or linguistic process is involved in resolving this incompatibility. In other words, we can say that coercion is involved. We have seen in Chapter 2 that there are different degrees of semantic compatibility. This implies that there are different ways and different degrees of difficulty for the verb meaning and the constructional meaning to be resolved. In this chapter, depending on different frequency pattern, I will examine the semantics of the verbs and discuss how the coercion is related with frequency: in what cases the verb semantics can be coerced and how the typical meaning of the verb is interpreted, and what metaphors or metonymies may be used.

4.1. Corpus Data Description

Strictly speaking, a certain corpus does not exactly reflect an individual's language use because it is a collection of different speakers' language use. Thus, the corpus does not reflect exactly an individual speaker's linguistic knowledge

(Newmeyer 2003: 696). However, by using corpus data, we can discuss a linguistic system generalized by or common among speakers in a community larger than a small and specific community, if we follow the assumption of the usage-based model that language use and grammar are closely related.

In order to examine the frequency pattern of the use of the DC and various verbs, I will use a part of the British National Corpus (Tagged) (BNC, henceforth). In addition, in order to confirm that the frequency pattern resulting from the BNC is consistent with that of American English, I analyzed a part of the American National Corpus (ANC). I will discuss the results from the ANC in 4.4.

4.1.1. Corpus data description of BNC

I selected a part of spoken data of the BNC, expecting that I can find more coercion cases because a spoken language is likely to be less strict and less sensitive to "prescriptive grammar" than a written language. Among the spoken data, I specifically selected the data of casual conversation. Then, I selected 1/3 of the conversation files and used these selected files. The number of words in the corpus selected from the BNC for this study was about 1,450,000.

The software that I use to search for the instances of the DC is *MonoConc Pro* (Barlow 1996, 2004).

I used a regular expression in order to find the instances used as the DC as in (70).[33]

[33] I acknowledge Michael Barlow for assistance in modifying regular expressions and obtaining recall rates.

(70) <w VV[A-Z]+>([A-Za-z])+\s{1,3}(<w ([ACD][A-Z012]+)+>[a-z]+(\s){0,3}){0,2}<w [A-Z]*N[012A-Z]*(-[012A-Z]+)*>[a-z]*(\s){0,3}(<w([ACD][A-Z012]+)+>[a-z]+(\s){0,3}){0,2}<w [A-Z]*N[012A-Z]*(-[012A-Z]+)*>[a-z]*

This regular expression finds instances of a word string [Verb Noun1 Noun2]. Between the Verb and Noun1, there can be zero to two words as in (71). These words may be determiners (definite/indefinite articles, demonstratives, and quantifiers) and adjectives. Also, between Noun1 and Noun2, zero to two determiners and adjectives can occur.[34]

(71) John *gave* [*girls* / the *girls* / the little *girls*] [*roses* / the *roses* / the red *roses*].

The regular expression in (70) finds only the instances where the Noun1 is either a common noun or a pronoun, but not a proper noun. In order to search for instances of a proper noun, I ran another regular expression as in (72).

(72) <w VV[A-Z]+>([A-Za-z])+\s{1,3}(<w ([ACD][A-Z012]+)+>[a-

---

[34] This regular expression finds the instances where there can be up to two words between the Verb and the Noun1 and between the Noun1 and the Noun2. Therefore, if there are cases where three or more words occur between V and N1 and V and N2 such as ‘John gave the beautiful little girl the most delicious cookies’, we miss those instances. However, I assume that there are very few of such cases. Actually, the recall rate was 81.82% and most of the missing cases were tagged wrong.

```
z]+(\s){0,3}){0,2}<w NP0>[A-Za-z]*(\s){0,3}(<w ([ACD][A-Z012]+)+>[a-z]+(\s){0,3}){0,2}<w [A-Z]*N[012A-Z]*(-[012A-Z]+)*>[a-z]*
```

The regular expressions above found instances of the DC such as (73).

(73) I must *give* Kim [rings/a ring/a beautiful ring]. (BNC_KBF)

In (73), the subject is the person who transfers an entity (Agent), N1 is the person receiving the entity (Recipient), and N2 is the entity transferred from the Agent to the Recipient (Patient).

Some of the word strings of [V N1 N2] are not related with the DC. A few are presented in (74) and (75).

(74) a. …he would *call* a spade a spade (BNC_KB0).

b. …would you like to take that resolution first and *make* this an extra resolution. (BNC_KB0)

(75) a. it *cost* **her** fifteen pound. (BNC_KB6)

b. we won't *charge* **you** a pound for this (BNC_KP1)

c. …they're gonna *fine* **you** two thousand pound. (BNC_KD8)

d. I *bet* **you** any money you like. (BNC_KPA)

In the examples in (74), the N2 functions as a predicate nominative: the N1 and N2 refer to the same entity. On the other hand, N1 and N2 in the DC refer to different entities, specifically a Recipient and a Patient. Also, there is no transfer sense at all in

(74). Thus, I exclude these instances because they are clearly not instances of the DC.

I also exclude instances like those in (75), even though they have the same syntactic form of [V N1 N2], because the semantic roles of the arguments are different. In (73), N1 is a Recipient who receives something that the Recipient has not possessed but belonged to the Agent. However, the N1 in (75a)-(75c) is the person who loses something, not receives it.

Bresnan and Ford (2010) included *charge* and *bet* when discussing the dative alternation between the double object construction (the DC in this study) and *to/for*-preposition construction. Pinker (1989: 111) regarded verbs such as *cost, charge*, and *bet* as "verbs of future not having," and suggested that they can occur in the double object construction, [V N1 N2]. These verbs syntactically take two different objects as the arguments of the verb, and thus, the verbs can be discussed as occurring in the double object construction. However, Bresnan and Ford (2010) and Pinker (1989) did not examine specific meaning of the verbs nor consider the constructional meaning of the double object construction. In this study, I follow the approach of Construction Grammar that constructions have their own semantics. Considering the constructional meaning of the DC, we can say that the DC is one type of the double object construction, which specifically has the meaning, 'successful transfer between a volitional Agent and a willing Recipient.' Even though *cost, charge*, and *bet* occur in the double object construction, the instances where these verbs are used in the double object construction are not examples of the DC. Therefore, I exclude the instances in (75).

Specifically, in (75a), the subject is the transferred object (Patient), and N2 is the money which is transferred to the other unexpressed participant (i.e. a seller) in exchange for the Patient. The N1 (*her*) is the person who loses, rather than gains, the amount stated as the Patient. Therefore, N1 is not considered to be a Recipient. In (75b) and (75c), the subject forces or wants to make the person designated in N1 pay the money. Therefore, the subject is the intended Recipient who is expected to receive the money, N1 will lose the money, and N2 is the Patient which will be transferred from N1 to the subject. Therefore, the direction of transfer is reverse.

Lastly, *bet* in (75d) can be discussed within the frame of RISK proposed by Fillmore and Atkins (1992). According to their analysis, the subject is the person who risks the money. The subject, *I*, can win or lose the money by the action designated by *bet*. Therefore, *I*, in (75d), is the Actor of the betting and at the same time, can be the Victim or a potential loser of the money. N1, *you*, can be a person who may win or lose the money (i.e. Beneficiary or Victim). N2, *any money*, is the valued object. Since the participants' roles in (75) are different from those in (73), the instances of *bet* are set aside.

I also excluded the instances where a clause is used as if it is a Patient as in (76).

(76) a. He *told* **you** to do anything. (BNC_KBM)

b. She *told* **her** that she wanted Jay out. (BNC_KB6)

It is possible to see a *to*-infinitive complement in (76a) and a sentential complement in (76b) as extended cases of Patient of the DC. However, it is also possible to see the sentences in (76) as the examples of different constructions. In (76a), the transferred message is 'to do anything,' but by occurring in the construction [V NP *to*-infinitive complement], *tell* does not indicate a simple transfer of message, but it carries a speech act of causation. Since the meaning of the construction is different, I excluded the cases where the infinitive complement occurs after NP1.

Moreover, I also excluded the cases where a full sentential complement occurs after NP1, as in (76b). If we decide to exclude a construction with a small clause complement like [V NP *to*-infinitive complement], it is not clear whether we have to regard the construction with a full clause complement like [V NP clause] as a case of the DC. In order to simplify the discussion, I excluded the instances where clause (infinitive / sentential complement) is used after NP1.

After discarding the instances that are not true instances of the DC, only about one seventh of the instances found by the regular expressions (70) and (72) were left, which resulted in 1,374 instances of the DC. The number of the different verbs that occur with the DC is 49. In other words, the token frequency of the DC is 1,374 and the type frequency of DC by verb is 49.

Note that regular expressions are a way of finding as many instances of the target construction as possible in an automated way. They may not find all instances for various reasons such as mistagging or unusually long strings of a certain types of words occurring in the target construction. Therefore, in order to test how complete the results found by a search using the regular expression are, I use a corpus linguistic concept, called **recall rate**. Recall rate is obtained by using a sample of the corpus used in the current study. We compare the number of DC that actually exist in the sample and the number of ditransitive instances in the sample that are found by the regular expression.

I selected one of the files (BNC_KB6) from the part of the BNC Spoken corpus used in this study as a sample. This sample contains 14,400 words, which is 1% of the total number of words analyzed in this study. First, I manually counted number of DC by reading through the text of the sample corpus. The number of instances that actually exist in the text was 33. The regular expression (70) found 27 of these instances. Therefore, the recall rate of the regular expression (70) is 81.82. In other words, with the regular expression (70), I can capture approximately 82% of the DCs from the corpus. The instances missed by (70), as determined by inspection, were either tagged differently[35] or not tagged at all.

In addition, in the sample corpus, there actually exists only one ditransitive instance of which the indirect object is a proper noun (*she'd given Jason extra work*). The regular expression (72) found this instance. Therefore, the recall rate of the regular expression (72) was 100.

(77) summarizes the important information of the corpus described above.

(77) a. the total number of words in the corpus: 1,450,000

b. the number of instances of the DC found by the regular expressions (70) and (72) (token frequency): 1,374

c. the number of verbs used with the DC found by the regular expressions (70) and (72) (type frequency): 49

d. the recall rate of the regular expression (70) and (72): 81.82 and 100

Since I manually checked if the instances resulting from the corpus search are the true instances of the DC and manually recorded which verbs occur in the DC as a main verb, we can confidently analyze the frequency pattern of which verbs more frequently occur with the DC and which verbs less frequently occur with the DC. I

[35] The regular expression (70) finds instances where the noun is tagged as <w _N_>. However, the nouns of the missing instances were tagged as <w NN1-VVB> or similarly. I miss these instances by using the regular expression (70).

will examine how the frequency pattern is correlated with the semantics of the verbs in 4.2 and 4.3.

4.1.2. Corpus description of the ANC

One of the issues raised by using a part of BNC is that BNC shows usage pattern of British English. However, this study aims to correlate the frequency pattern with the processing effort and acceptability judgments in the end. The participants of experiments will be speakers of American English. The problem is that the frequency pattern of a certain construction may be different across varieties of English.

For example, Bresnan and Ford (2010) claim that probability that speakers choose one grammatical construction over an alternative can be different across varieties of the same language according to their linguistic knowledge. For example, when people are asked to choose one of the constructions between [V NP1 NP2] (i.e. DC) and [V NP PP] (i.e. prepositional complement construction), American English (AmE) speakers and Australian English (AusE) speakers react differently. It is suggested that AmE speakers were more tolerant of [V NP1 NP2] where NP1 is a Recipient of relatively long NP than AusE speakers. For example, when the Recipient length is increased from *my kids* to *my kids and their cousin who is staying with us*, AusE speakers were more likely to choose [V NP PP] over [V NP1 NP2] than AmE speakers do. This means that AusE speakers disfavors [V NP1 NP2] when the NP1 is long. On the other hand, Australian English speakers were more tolerant of [V NP PP] where NP is a Patient of relatively long NP. For example, the participants read sentences like *They gave the wrong medicine to them.* When the length of the Patient is increased from *the wrong medicine* to *the wrong and often dangerous medicine*, AusE speakers showed little increase in reaction time at *to* in the PP, while AmE speakers slowed down significantly. It suggests that AmE speakers disfavors [V NP PP] when the NP is long. The results from the experiments showed that AmE speakers and AusE speakers show slightly different preferences for dative alternation.

As the study above suggests, in order to correlate the frequency of usage obtained from British English corpus and the results of the processing experiments obtained from American English speakers, it should be assumed that British English and American English show similar patterns regarding co-occurrence of verbs and the DC. In order to check their similarity, I analyzed a small sized corpus of American English. From the American National Corpus, I analyzed a subpart of ANC, Charlotte, which is a face-to-face conversation corpus of 200,000 words. I used the following regular expression in (78) to search for the instances of the DC.

(78) \w[A-Za-z]*_V[A-Z]*\s([a-z]*_((DT)|(CD)|(PDT)|(POS)|(PRP\$)|(RP)|(J[A-Z]+))\s){0,3}\w[a-z]*_((N[A-Z]*)|(PRP))\s([a-z]*_((DT)|(CD)|(PDT)|(POS)|(PRP\$)|(RP)|(J[A-Z]+))\s){0,3}\w[a-z]*_((N[A-Z]*)|(PRP))

(79) below summarizes the important number of instances about the Charlotte.

(79) a. the total number of words in the Charlotte: 200,000

b. the number of instances of the DC found by (78) (token frequency): 211

c. the number of verbs used with the DC found by (78) (type frequency): 21

The results from Charlotte will not be the main subject of this chapter due to its small size, while the results from BNC will be dealt with as main data. The Charlotte data will be used only to confirm the similarity between the British English and American English about the frequency pattern of collocation of the DC and various verbs. However, analysis on Charlotte will support correlation between the frequency pattern and the experimental results. I will discuss the results of the corpus analysis of Charlotte and compare it with the results from the BNC in 4.3, after the discussion of the BNC.

4.2. The Results of collexeme analysis for the ditransitive construction

In order to examine which verb is more frequently associated with the DC compared to the other verbs and compared to the other construction, I used collexeme analysis (Stefanowitsch and Gries 2003, as applied by Gries et al. 2005, Gries et al. 2005, and Hilpert 2008), which was introduced in 2.4.2.

Table 11 summarizes the result of the collexeme analysis. The verbs are ordered and ranked by their collostruction strength: the first verb as the most attracted by the DC (i.e. the most frequently associated with the DC) and the last verb as the least attracted by the construction (i.e. the least frequently associated with the DC).

Rank	**Verb**	**Uses in DC**	**Number of Instances**	**p**	**Collo_Strength**
1	*give*	710	1825	0	∞[36]
2	*tell*	123	2008	1.11E-65	64.95539
3	*show*	50	368	6.67E-44	43.17604
4	*send*	44	372	3.9E-36	35.40936
5	*buy*	65	1127	1.47E-33	32.83304
6	*owe*	16	62	9.26E-20	19.03328

[36] The collostruction strength of *give* was so strong that the strength was almost infinity.

7	*lend*	13	46	6.85E-17	16.16459
8	*offer*	10	63	1.32E-10	9.879097
9	*take*	3	2916	1.46E-07	6.837137
10	*put*	7	3221	8.46E-06	5.072527
11	*pass*	9	170	1.49E-05	4.827981
12	*pay*	21	861	1.7E-05	4.770062
13	*promise*	4	36	0.000227	3.64321
14	*make*	35	2123	0.000245	3.611189
15	*ask*	19	896	0.00025	3.601366
16	*bring*	14	571	0.000388	3.411728
17	*save*	7	160	0.000421	3.375409
18	*sell*	9	329	0.001963	2.70708
19	*read*	10	408	0.002517	2.599117
20	*scoop*	1	2	0.01657	1.780677
21	*hand*	2	29	0.02421	1.616005
22	*write*	9	497	0.02494	1.603104
23	*wish*	4	137	0.02812	1.550985
24	*feed*	2	41	0.04582	1.338945
25	*fax*	1	6	0.0489	1.310691
26	*swap*	2	43	0.04991	1.301812
27	*draw*	3	105	0.05779	1.238147
28	*deny*	1	11	0.08782	1.056407
29	*spin*	1	13	0.1029	0.987585
30	*refuse*	1	15	0.1178	0.928855
31	*teach*	2	77	0.1349	0.869988
32	*find*	4	942	0.2067	0.68466
33	*cook*	2	109	0.2299	0.638461
34	*provide*	1	32	0.2346	0.629672
35	*hire*	1	34	0.2473	0.606776
36	*leave*	11	981	0.2884	0.540005
37	*build*	2	131	0.2975	0.526513
38	*cause*	1	43	0.3019	0.520137
39	*set*	2	134	0.3067	0.513286
40	*pour*	1	45	0.3134	0.503901
41	*chuck*	1	54	0.3632	0.439854
42	*earn*	1	55	0.3685	0.433563
43	*serve*	1	77	0.4746	0.323672
44	*throw*	2	200	0.6844	0.16469
45	*run*	4	457	0.7948	0.099742
46	*get*	139	16619	0.9283	0.032312
47	*allow*	1	172	1	0

47	*drop*	1	139	1	0
47	*sort out*	1	155	1	0

Table 11. Verbs that occur with the ditransitive construction, ordered by the collostruction strength

The verb that has the strongest collostruction strength is *give*, meaning that it is the verb most strongly associated or the verb which most frequently occurs with the DC. Other verbs that are strongly associated with the DC are *tell, show, send,* and *buy*. Verbs that are least strongly associated with the DC are *allow, drop,* and *sort out*. Since their collostruction strength of is the same as 0, they are ranked at 47 equivalently.

The verbs that occur with the DC observed in this corpus are listed and semantically classified below in Table 12. They are classified according to Pinker's classification (Pinker 1989) with Goldberg's modification (Goldberg 1995) (c.f. Table 9 in Section 3.2). The first column lists the subclass of the verbs that can be used in the DC as found by Pinker (1989) and Goldberg (1995), and the second column contains the verbs that actually occur in the corpus in this study. The numbers in the parentheses next to each verb are the ranks resulting from the collexeme analysis. The bold-faced verbs are mentioned as examples of each verb subclass by Pinker (1989) and Goldberg (1995) while the non-bold-faced verbs are not mentioned as examples by them, but I classified them according to their similar semantics.

Verb Subclass	Result of the Collexeme analysis
Verbs that inherently signify acts of giving	***give***(1), ***lend***(7), *offer*(8), ***pass***(11), *pay*(12), ***sell***(18), ***hand***(21), ***feed***(24), *swap*(26)
Verbs that instantaneous causation of ballistic motion	*chuck*(41), ***throw***(44), *drop*(47)

Verbs of sending		send(4)
Verbs of continuous causation of accompanied motion in a deictically specified direction		***take***(9), ***bring***(16)
Verbs of future having	The subject argument actually acts to cause the first object argument to receive the second object argument at some later time:	*save*(17), ***leave***(36)
	Only if the conditions of satisfaction associated with the act denoted by the predicate hold	owe(6), promise(13)
	The subject argument only enables the first object argument to receive the second object argument	allow(47)
Verbs of communicated message		***tell***(2), ***show***(3), ***ask***(15) ***read***(19), ***write***(22), ***teach***(31)
Verbs of instrument of communication		***fax***(25)
Verbs of creation		***make***(14), *draw*(27), *spin*(29), ***cook***(33), ***build***(37)
Verbs of obtaining		***buy***(5), ***find***(32), *hire* (35), ***earn***(42), ***get***(46)
Verbs of refusal		***deny***(28), ***refuse***(30)

Table 12. Classification of the verbs that occur with the DC

We can see in Table 12 that the verbs that can occur with the DC proposed by Pinker (1989) and Goldberg (1995) and the verbs occurring in the DC in the corpus considerably overlap. This supports the general validity of their categorization for the verbs occurring in the DC because the verbs actually used in the DC.

However, there were verb that did not belong to any of the subclasses that were noticed by Pinker (1989) and Goldberg (1995) as occurring in the DC. I classified these verbs based on their semantics and presented in (80) below. Again, the numbers in the parentheses are the ranks resulting from the collostruction strength.

(80) a. Verbs of motion internal to the Agent (henceforth, *intransitive verb*, for

short)[37]: *run*(45)

b. Verbs of placement: *put*(10), *set*(39)

c. Verbs of hope: *wish*(23)

d. Verbs of general causation: *cause*(38)

e. Verbs of portion transfer: *scoop*(20), *pour*(40)

f. Others: *provide*(34), *serve*(43), *sort out*(47)

Pinker (1989) and Goldberg (1995) did not mention how they obtained the verbs that could be used in the DC; whether they used corpora or whether they depend on their own intuition or both. If they used corpora, they may have not noticed these verbs as occurring with the DC probably because these verbs were not frequent or did not occur at all in the corpus that they used. If they depend on their intuition, they did not think these verbs could be used in the DC because these verbs are not very semantically compatible with the DC. As I will show in 4.3.2 below, these verbs in (80) are neither semantically very compatible nor frequently associated with the DC.

Figure 9 below shows the verbs in each verb subclass in the order of collostruction rank.

[37] The label, "intransitive verb," is a syntactic term, while the labels for the other verb subclasses are semantic. However, the verbs of motion which occurs in the dominion of the Agent, such as *run, sleep*, and *stay*, will be labeled as intransitive verbs, for convenience.

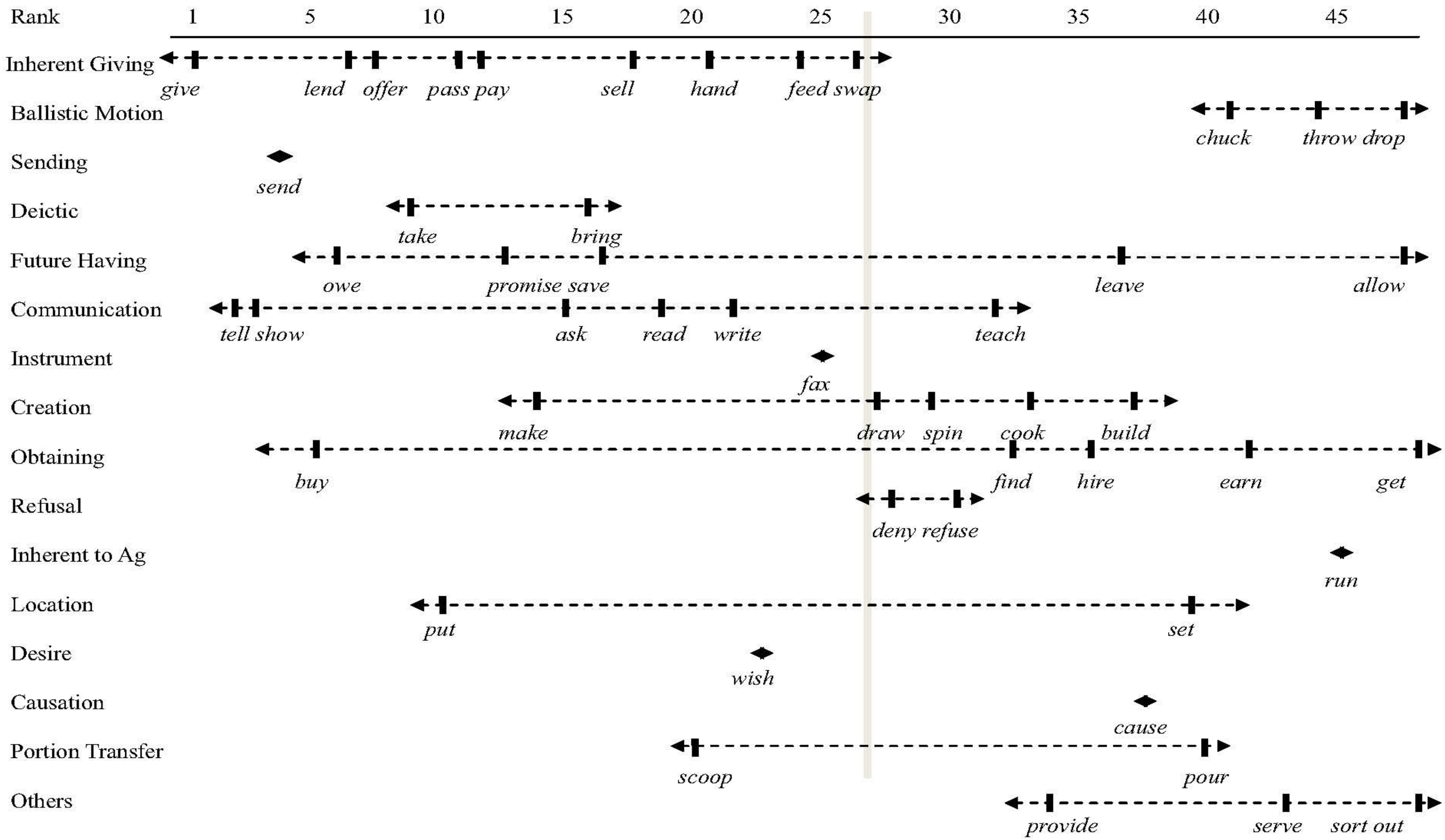

Figure 9. Classification of the verbs that occur with the DC

In this study, for convenience of discussion, I set up a potential cut-off point to divide the verbs that are more strongly associated with the DC and those that are less strongly associated with the DC. It is the *p*-value of 0.05, which is between the rank of 26 and 27 (c.f. Table 11). From this point, the verbs more frequently associated with the DC are ranked in the position from 1 to 26 and the verbs less frequently associated with the DC are ranked from 27 to 48. The cut-off point is expressed as a gray vertical line in Figure 9.

4.3. Discussion

Based on the result of the collexeme analysis, shown in Figure 9, I will explore the semantic properties of the verbs that more frequently co-occur with the DC and the verbs that less frequently co-occur with the DC.

Since the verb subclasses proposed by Pinker (1989) and Goldberg (1995) reflect the commonality in meaning of individual verbs in each subclass, it will be convenient to discuss the verbs of similar meaning by using the subclasses. However, we can see in Figure 9 that we cannot sharply determine which verb subclasses are more frequently associated with the DC and which are less because in most verb subclasses, some verbs in the same verb class are ranked higher than 27 while others are ranked lower. For example, most communication verbs were ranked higher than 27 while *teach* lower than 27. Nevertheless, we can still find a tendency that some verb subclasses are relatively more strongly associated with the DC and some are less, even though the subclasses have a few verbs that are exceptions.

The semantic properties of the verbs, analyzed according to whether the verbs are more frequently associated with the DC or less, will be correlated with the degree of semantic compatibility with the DC examined in Chapter 3. This analysis will show what semantic properties makes a verb more associated with the DC and how the conflicting semantic properties between the verb and the DC are resolved in the cases of the verbs that are less frequently associated with the DC. When there are verbs that are exceptionally strongly or weakly associated with the DC within the same verb subclass, I will explore their semantics more in depth.

4.3.1. Verbs that are more frequently associated with the DC

The verb classes that are relatively frequently associated with the DC (i.e. ranked higher than 27) are presented in (81) with individual verbs in each subclass from the data set. The bold-faced verbs are mentioned as examples of each verb subclass by Pinker (1989) and Goldberg (1995) while the non-bold-faced verbs are not mentioned as examples by them, but I classified them according to their similar semantics.

(81) Verb classes more frequently associated with the DC

a. Verbs inherently signifying giving: ***give***(1), ***lend***(7), *offer*(8), *pay*(12), ***pass***(11), ***sell***(18), ***hand***(21), ***feed***(24), *swap*(26)

b. Sending verb: ***send***(4)

c. Deictic Verb: ***take***(9), ***bring***(16)

d. Communication: ***tell***(2), ***show***(3), ***ask***(15) ***read***(19), ***write***(22), ***teach***(31)

i. Verbs of instrument of communication: ***fax*** (25)

4.3.1.1. Verbs inherently signifying giving

All verbs inherently signifying giving are in the higher-attraction group.

As we saw in Table 11, *give* is the verb most frequently associated with the DC.

The verb *give* is so semantically compatible with the DC that its meaning is almost a complete overlap with the meaning of the DC, and thus, strong attraction with the DC is expected. The result of the collexeme analysis supported this expectation. According to Langacker (2008:243, 393), the most notable transfer verb is considered to be *give*. The verb *give* conveys the meaning that the Agent causes another entity to move from its own dominion into that of the Recipient (c.f. Langacker 2008: 242). It does not specify any particular method of transfer or a complicated process of transfer. In this sense, *give* provides the most basic meaning of transfer between an Agent and a Recipient: the Agent causes the Recipient to receive the Patient. This meaning of the verb *give* is identical with the meaning of the DC, and therefore, *give* is the most compatible with the DC.

In the subclass of 'verbs inherently signifying giving,' the verbs that are ranked lower than *give* have a slightly different subframe that contains more specific meaning than *give*. In addition to the meaning of 'transfer of possession of the Patient from the Agent to the Recipient,' *lend* indicates an event where the Agent transfers to the Patient to the Recipient so that the Recipient can use it for a period of time. *Offer* means that the Agent transfers the Recipient an entity which the Agent thinks the Recipient needs or desires. *Pass* and *hand* mean that the Agent transfers an entity to the Recipient by means of specific method, i.e. using hands. *Sell* means that the Agent transfers an entity to the Recipient in exchange for money. The verb *feed* specifies the kind of the entity that is transferred as food or drink. *Swap* adds to the meaning of transfer the meaning that the Recipient also transfers another entity to the Agent in exchange for the first entity.

The verbs in the subclass 'verbs inherently signifying giving' show that even in the same semantic class, the degree of association with the DC can be different. For example, verbs such as *give* highly frequently occur with the DC while verbs such as *swap* are less frequently occur with the DC. The different degree of association with the DC means that verbs in the same semantic class can have different degrees of compatibility with the DC depending on their different specific semantics. Despite different strengths of the association with the DC, the verbs that share the semantics of 'inherently signifying giving' are relatively more highly ranked and they are relatively more compatible with the DC because their meaning inherently assumes transfer of possession between two participants.

4.3.1.2. Verbs of sending

The next subclass that is strongly associated with the DC is 'sending verbs.' *Give* does not specify the directness or indirectness of transfer. However, *send* indicates an event where the transfer is performed somewhat indirectly, specifically through delivery. This verb can occur with the Location argument instead of the Recipient as in (82).

(82) a. They *sent* the letter to the office.

b. I *sent* the office a letter requesting written documentation.

In (82a), *send* occurs in the caused-motion construction and in (82b), it occurs in the DC. Even though used with the Location argument in both examples, there is a strong assumption in both cases that the Patient will be transferred to a 'person' in the location. Therefore, to the extent that that *send* refers to a transfer of an entity between an Agent and a Recipient, it is highly compatible with the DC.

4.3.1.3. Deictic verbs

As I have expected in 3.2.2.1, 'verbs of continuous causation of accompanied motion in a deictically specified direction' (*take* and *bring*) are also frequently associated with the DC. Though these verbs can be used in a simple transitive and a construction with a Location, these verbs have three salient participants in the event scene and transfer occurs between the Agent and the Recipient. In addition to the meaning of simple transfer, these verbs designate deictic direction.

4.3.1.4. Verbs of communicated message

Among the communication verbs, *tell*, *show*, and *ask* were relatively highly associated with the DC compared with the other three verbs, *read, write*, and *teach*.

Unlike the verbs listed above which are usually used to designate physical transfer or transfer of ownership, 'verbs of communicated message' refers to metaphorical transfer. In this corpus, the Patient arguments which most frequently co-occur with the communication verbs were not a concrete entity. For example, *tell* in the DC were used with the Patient of narratives such as *joke, gossip, story, secret, truth*, and *lie*. The Patient that most frequently co-occurs with *ask* is *question*. Through the conduit metaphor (Reddy 1979, as cited by Goldberg 1995), 'communicated message as an entity travelling across from the stimulus to the listener' (Goldberg 1995: 148), as was discussed in 3.2.2.1, *tell* indicates that the Agent verbally transfers information to the Recipient. *Ask* means that the Agent transfers a question to the Recipient. In the case of *show*, the frequently co-occurring Patient arguments are visually perceivable entities such as *photo, picture, map, room,* and *flaming car*. When *show* is used in the DC, it exploits the conceptual metaphor 'perception as entities which move toward the perceiver' (Goldberg 1995). Via this metaphor, *show* means that the Agent transfers information by making the Recipient visually perceive it and gain knowledge of it.

These communication verbs inherently assume that there is an interlocutor that receives the information initiated by the Agent. More specifically, we cannot imagine events in which a person tells a story but no one is told the story, a person shows a picture but no one is shown the picture, or a person asks a question but no one is asked the question. Even though these communication verbs are metaphorical, they can be considered as verbs that inherently signify acts of transfer. Therefore, they are quite compatible with the DC.

Even among the 'verbs of communicated message,' when the method of transfer is specified in the verb meaning, the verb is relatively ranked low. For example, *read* and *write* specify that the message is transferred through script. Since the information is transferred through script, the author who gives information and the reader who receive the information do not have to interact directly. Therefore, either the person who transfers messages or the person who receives the messages does not have to be salient in the event scene together. Therefore, these verbs can occur in a simple transitive sentence as in (83).

(83) a. She'll have to *read* these books. (BNC_KB3)

b. She can't really *write* articles in English. (BNC_KCV)

There can be only two salient participants in the event scene of *write* and *read*; the Agent and the Patient. For example, in (83a), the Agent herself is the person who receives the information from the book. In (83b), when the author writes an article, she assumes that there would be readers who receive the information through the article but the relationship between the author and the reader is so indirect that the reader is not salient.

Because *read* and *write* do not always require a Recipient in the event scene, it may be less frequently associated with the DC than *tell*, *ask*, and *show*.

However, these verbs can occur in the DC as in (84).

(84) a. we'll go and have a bath and then I'll *read* you a story, okay? (BNC_KDE)

b. I mean I've *written* her a letter (BNC_KE6)

When *read* occurs in the DC as in (84a), the Recipient of the information is not the Agent herself but another person who listens to her reading a story. When *write* occurs in the DC as in (84b), the person who receives the message became salient and linguistically expressed as the second object.

Teach is also a bit less strongly associated with the DC compared with *tell, show*, and *ask*. It can occur in the DC as in (85).

(85) a. Text books don't teach you *everything*. (KE3)

b. She taught children *French*. (CCED_AL)

The Patient that is *taught* can be a noun as in (85a) and (85b). In both cases, the things that are taught are not simply communicated messages but they are the whole concepts, processes, and skills 'about' the Patient. Therefore, the things that are taught can often be expressed as clauses, as in (86).

(86) The difficulty is teaching the girls *how to use that machine properly*. (BNC_KPA)

In (86), the information indicated by the clause, *how to use that machine properly*, can be viewed as an extended case of Patient, as I discussed in 4.1. I found from the corpus four instances where the clause is used as if it is a Patient. Since I excluded from this study the instances, in which the clause is used after NP1, like (86), these four instances were not counted as the instances of the DC, as I stated in 4.1.

Often, the Recipient of teaching action is just "students." When the Recipient of the information is too general, like "students," the Recipient is not salient in the event scene, and thus, it is not linguistically expressed as in (87).

(87) He's usually *teaching* chemistry but it's his first year of *teaching* math. (BNC_KPA)

In (87), the information about chemistry will be transferred but the Recipient is not specific. Therefore, *teach* occurs in a monotransitive construction.

Because the Recipient of *teach* does not have to be salient in the event scene or the transferred information is often expressed as a clause, *teach* is a bit less compatible with the DC than *tell* and *show*. Therefore, it is less strongly associated with the DC than *tell,* and *show*.

Although *read*, *write,* and *teach* are not highly associated with the DC, these verbs are basically used for expressing communication. Communication is transfer of information. Therefore, we can say that the verbs in the 'communication verbs' subclass in general are relatively compatible with the DC and, as I predicted in

Chapter 2, they are relatively strongly associated with the DC.

4.3.1.5. Verbs of instrument of communication

As I predicted in Chapter 2, the 'verbs of instrument of communication' such as *fax* may be fairly compatible with the DC because they also indicate metaphorical transfer of information between two participants.

However, the frequency rank of *fax* is relatively low compared with the communication verbs. This might be because *fax* involves a metonymy 'OBJECT FOR AN ACTION IN WHICH THE OBJECT IS INVOLVED.' Originally, a *fax* is a noun indicating an instrument used for sending and receiving messages, but in order to use it as a verb, people have to coerce it via this metonymy. Verbs of instrument of communication may not be as compatible as *tell* or *show* because of coercion from noun to verb, and thus, not as frequently associated with the DC as *tell* or *show*.

4.3.1.6. Summary

The verbs explained above such as 'verbs inherently signifying giving,' 'sending verbs,' 'deictic verbs,' 'communication verbs' have common semantics: that there is a Recipient and an Agent transfers an entity to this Recipient. This basic and common meaning is conveyed by *give* and this verb is the most frequently associated with the DC. When a verb evokes a subframe that is slightly more detailed than the frame evoked by *give*, it is less frequently associated with the DC than *give*. For example, verbs such as *lend* and *offer* evoke more details such as giving back to the Agent later or asking the Recipient whether (s)he desires the transfer. The transfer can be specified as indirect as in *send* or deictic as in *take* and *bring*. The communication verbs also assume a metaphorical transfer between the Agent and the Recipient. When coercion from noun to verb (through metonymy) is involved, the verb is less associated with the DC as in the case of *fax*. Also if the relation between the Agent and the Recipient is rather indirect as in the case of *read, write*, and *teach*, the verb is often associated with the constructions which do not require a Recipient. Thus, it is less associated with the DC.

Even though all these verbs belong to different semantic subclasses and have different details, they frequently occur in the DC. The common semantics of these verbs is that in the event frame of these verbs, a Recipient exists and transfer of possession is performed between the Agent and the Recipient. Moreover, the condition of the Patient is intact. When we compare this meaning with the result of the semantic analysis of compatibility in Chapter 2, it corresponds to the first category 'verbs of inherent transfer,' which is the most compatible with the DC. The subclasses that are frequently associated with the DC are almost identical with those in the verbs that are the most compatible. It means that the semantics property of 'inherent transfer' makes verbs more semantically compatible and frequently associated with the DC. Since the meaning of the 'verbs of inherent transfer' conforms to the meaning of the DC, they involve little or no coercion. Therefore, I predict that these verbs will be processed relatively fast compared with the verbs that are not very compatible with the DC, which will be tested in Chapter 5.

4.3.2. Verbs that are less frequently associated with the DC

The verbs that are less frequently associated with the DC are presented below.

(88) Verbs less frequently associated with the DC

a. Ballistic Motion: *chuck*(41), ***throw***(44), ***drop***(47)

b. Creation: ***make***(14), *draw*(27), *spin*(29), ***cook***(33), *build*(37)

c. Obtaining: ***buy***(5), ***find***(32), *hire* (35), ***earn***(42), ***get***(46)

d. Refusal: ***deny***(28), ***refuse***(30)

e. Intransitive: *run*(45)

f. Desire: *wish*(23)

g. Causation: *cause*(38)

h. Portion transfer: *scoop*(20), *pour*(40)

Even though the verbs presented above can occur with the DC, the collostruction strength is lower than the verbs in (81). The verbs that are less strongly associated with the DC have the commonality that in the central meaning: that there is no Recipient in the event scenario and they do not have the meaning of transfer of possession to the Recipient when occurring in other constructions.

4.3.2.1. Verbs of ballistic motion

First, as shown in 3.2.2.2, in the event scene of the 'verbs of ballistic motion,' a person who will catch the thrown entities does not have to exist. In other words, a Recipient is not required by the action.

However, when these verbs occur in the DC, the N2 is interpreted as a Recipient.

(89) a. *Throw* us the bin. (BNC_KP1)

b. She's got no change, so she's going to *drop* me the pound in [the machine]. (BNC_KDW)

In (89a), *the bin* is transferred to *us* via the caused motion of throwing. In (89b), the money is transferred to the machine, while the Recipient, *me*, is a beneficiary who metaphorically receives the action of her dropping the pound in the machine. When the ballistic motion verbs occur in the DC, the meaning of physical transfer or the benefactive meaning is added to the central meaning of the verbs that describe how an entity is released. Therefore, we can say that the verb meaning of body motion with the caused motion of the Patient is coerced into the meaning of transfer.

4.3.2.2. Verbs of creation

The 'creation verbs' also do not carry the meaning of transfer when they occur in other constructions as we have seen in (59a). They indicate 'to create an entity by means of X such as cooking, spinning, etc.'

Nevertheless, when these verbs are used in the DC, they are coerced into the transferring meaning as in (90).

(90) a. I've *cooked* him a dinner. (BNC_KCD)

b. They'll *spin* you a yarn… (BNC_KDW)

In (90), the Agent brings a dinner into his or her dominion by the creating it, and then transfers it to the Recipient. Therefore, the meaning of the DC adds the meaning of physical transfer to the creation verbs, and the meaning of the creation verbs is interpreted as the prior event of transfer.

In (90), to *spin a yarn* in the context of the corpus metaphorically refers to 'to tell a story.' Since *spin* is interpreted as if it is a communication verb, it can occur in the DC as naturally as the communication verbs such as *tell* and *show*.

Because the Recipient is also usually a beneficiary, as I stated earlier in 3.1, the creation verb can be coerced to have a benefactive meaning as well. For example, we can imagine a situation where the person who always cooks is 'him,' but today, 'I' cook for the benefit of him. In this case, the transfer is metaphorical: 'actions which are performed for the benefit of a person are understood as objects which are transferred to that person' (Goldberg 1995). Therefore, the use of the creation verbs in the DC can be a physical transfer meaning and a metaphorical transfer, i.e. benefactive meaning.

4.3.2.3. Verbs of obtaining

Like the creation verbs, in the central meaning of the obtaining verbs also do not have a Recipient or transferring meaning in the event scene as in (58a) in Chapter 3, as repeated in (91). They simply mean 'obtaining an entity.'

(91) He could afford to *buy* a house. (CCED_AL, modified)

However, when they occur in the DC as the following examples, coercion occurs to produce the meaning of transfer as in (92).

(92) a. I'd better *buy* **you** <u>a Christmas present</u> (BNC_KBF)

b. …if dad's *getting* **you** <u>some clothes</u>, and then wrap them up for Christmas (BNC_KBF)

In (92a), the Agent, *I*, buys the Patient (*a Christmas present*) and brings the Patient into the Agent's own dominion. Then, the Agent transfers the present to the

Recipient *you*. In (92b), the Agent, *dad*, obtains *some clothes* and transfers them to the Recipient, *you*. Both are coerced into the transferring meaning. In the coerced meaning, two events are conflated. The Agent carries out an action that brings the Patient under his control and the Patient is transferred to the Recipient.

Again, the use of obtaining verbs can have a benefactive meaning simultaneously. For example, in (92a), in the physical transfer sense, the Recipient physically receives the present. At the same time, the Recipient is benefited by receiving the present.

Note that in the subclass of 'obtaining verbs,' *buy* is a great deal higher in rank than the other obtaining verbs. In other words, *buy* is associated with the DC as frequently as the verbs inherently signifying giving (e.g. *give* and *send*), even though it is not semantically as compatible as the latters. A possible explanation for its exceptionally strong association with the DC is that we frequently experience and describe a situation where a buyer purchases something for another person. The frequent co-occurrence of *buy* with the DC becomes more entrenched, becomes more semantically compatible, and occurs more frequently in turn. So, can we say that in coercion is not involved at all in the co-occurrence of *buy* and the DC? If we consider frequency, it seems that it involves very little coercion. However, we need experiments to confirm this. If the processing time of the co-occurrence between the verb and the construction is slow, it suggests that it takes time due to coercion process. Therefore, *buy* needs more examination.

4.3.2.4. Verbs of refusal

The 'refusal verbs' are also ranked low. When these verbs occur in other constructions, they do not carry the meaning of transfer at all, as in (93).

(93) a. I *refused* to cut my fringe. (BNC_KC7)

b. …he *denies* that they saw it. (BNC_KPA)

The refusal verbs can occur with a clausal complement as in (93a) and (93b) (Biber et al. 1999). Actually, *refuse* and *deny* have different semantics in that they require a complement of different semantic type. For example, *refuse* is often used with the *to*-infinitive complement and the whole expression involves a deontic meaning: it describes the Agent's willingness. By using *refuse* in (93a), the Agent, *I*, says that I WILL NOT cut my fringe. On the other hand, *deny* is often used with *that*-clausal complement and it involves an epistemic meaning: it describes a fact or a proposition. Therefore, *deny* in (93b) means that *he* say that the content in the subordinate clause IS NOT true.

Even though these two verbs have different semantics, when occurring in the DC, both have similar semantics, specifically to 'prevent someone from receiving an entity' as in (94).

(94) a. She was left to bring up a family she had to go the banks for money the banks were all and they *refused* her money to keep the farm going. (BNC_KB0)

b. … however an adult must not *deny* a child the use [of a child seat or harness]. (BNC_KBM)

Refuse in (94a) is coerced into the meaning of 'not giving the money' to her. In (94b), *deny* is coerced to mean 'preventing another person from receiving an entity. In this example, *deny* can be analyzed as involving a metaphorical transfer: the action of using a child seat is conceptualized as a thing. In this particular example, *deny* is coerced into the meaning that an adult does not make a child use a child seat. The whole sentence means that this must not happen.

Interestingly, when refusal verbs occur in the DC, they express situations in which transfer does NOT happen because these verbs prototypically carry a negative meaning such as 'not allow to do' or 'to perform a speech act that negates a proposition.' Therefore, even though coercion occurs in order to express a meaning of transfer, the actually interpreted meaning of the sentence as a whole is that the transfer does not occur. Because of the more complex coercing process, I predict that such verbs will be harder to be coerced than the verbs of inherent transfer and the verbs of possible transfer. Therefore, the use of refusal verbs in the DC will take more time when speakers process it. This prediction will be tested in Chapter 5.

I expected that the refusal verbs would be less compatible with the DC than the 'verbs of possible transfer.' However, as is seen Figure 9, the refusal verbs are slightly more frequently associated with the DC than these latter verbs. It is possible that the difference in ranks between the refusal verbs and the verbs of possible transfer may be insignificant in practice, or the discrepancy may be limited to this particular corpus. Through the experiments of acceptability judgments and processing effort, I will try to investigate the discrepancy in Chapter 5.

4.3.2.5. Intransitive verbs

It was predicted in Chapter 2 that the intransitive verbs are so incompatible with the DC that coercion will be highly unlikely to occur and the verbs will not be likely to be used with the construction. However, interestingly, even an intransitive verb occurs with the DC in this corpus.

Run is a verb that is often used in an intransitive construction, which might be its most prototypical use. However, it can occur in a simple transitive construction. Let us examine (95).

(95) a. What I'll do is is exercise. / I enjoy it, I always used to *run*. (BNC_KCA)

b. They *run* this big machine… (BNC_KCA)

c. Claire you are asked to *run* a bath… (BNC_KCD)

The verb *run* is often used as an intransitive verb that describes a fast and active motion (c.f. CCELD). If it is used as an intransitive verb as in (95a), it only requires an Agent in the scene. However, there are also cases where *run* can be used as a transitive verb as in 'to run a restaurant' or 'to run an experiment,' meaning that you make something start and continue to work as in (95b). *To run a bath* in (95c) means to turn on the taps to fill a bath with water for bathing oneself (CCED_AL). In any cases of (95), *run* does not have the meaning of transfer.

When *run* is used in the ditransitive construction as in (96), it is interpreted as having a benefactive meaning: the first object is a beneficiary.

(96) … well would you like to go up and *run* Amy a bath? (BNC_KCD)

In (96), 'a bath' itself cannot be physically transferred even in the DC. Rather, when coercion occurs into the meaning of transfer, the action of 'to run a bath' is metaphorically transferred due to the metaphor of 'actions which are performed for the benefit of a person are understood as objects which are transferred to that person.'

Through the coercion, the whole expression is interpreted as ‘the Agent filled the bath tub for the benefit of Amy.’

It seems that *run* can occur in the DC because it can be often used in a monotransitive construction as in (95b) and (95c). If a verb is used in a monotransitive verb, in order to use this verb in the DC, we bring one more participant into the construction as a Recipient who receives the Patient, or a Beneficiary who is benefited by the action as in (96). However, other intransitive verbs, which do not occur in the monotransitive construction as in (97a), such as *stay,* may be very hard to be coerced to occur in the DC as in (97b).

(97) a. *John stayed the house.

b. *John stayed Amy the house.

If a verb which is associated only with an intransitive construction is to occur in the DC, we need to bring two more participants: a Recipient and a Patient. However, it will be very hard to coerce stay and make sense out of (97b). Consequently, I claim that a verb which is used in an intransitive construction will be harder to be coerced to occur in the DC than the verb which is used in a monotransitive construction.

4.3.2.6. Verbs of hope

According to the semantic analysis on compatibility in Chapter 2, the verbs of hope are ‘verbs of event internal to the Agent.’ The verbs belonging to this category is the least compatible with the DC. Actually, it seems that the verbs of hope, such as *hope* and *want,* are not compatible with the DC as in (98) and do not occur in the DC at all in this corpus.

(98) *I *hope/want* him good luck.[38]

By hoping and wanting something, the Agent does not exert a force that affects anything or anyone else. This event occurs only in the mind of the Agent. Therefore, *hope* and *want* are not semantically compatible with the DC.

Unlike *hope* and *want*, *wish* occurs in the DC in the corpus. *Wish* can often be used with the clausal complement such as sentential complement or *to*-infinitive complement as in (99).

(99) a. I just *wish* I could do that again. (BNC_KBX)

b. If you *wish* to say a short simple prayer of thanks, do so… (BNC_KB0)

When *wish* occurs with a clausal complement, it expresses the Agent's hope that the event in the complement will occur. It does not mean transfer.

Because *wish* expresses a person's hope or desire as shown in (99), I categorized *wish* as one of the verbs of hope. However, the verb *wish* has different semantics from *want* or *hope* in that when wishing for something, we express strong desire to have it or something to happen, and it happens by magic like in fairy tales (CCED_AL and in personal discussion with Suzanne Kemmer in 2011). The

---

[38] *Hope* and *want* also have different semantics as each can occur in different syntactic constructions (e.g. I [*hope/*want*] that you will get better soon. / I [*want/*hope*] you to go back home.). The semantics of these two verbs are out of the scope of this study. This may be studied in future researches.

examples of magical power of *wish* are in (100).

(100) a. A philosopher once said, 'Be careful what you *wish* for; you might get it.' (CCED_AL)

b. When you *wish* upon a star… anything your heart desires will come to you. (from the lyrics of *When you wish upon a star*)

In (100a), a philosopher said that we have to be careful when we wish for something because the wishing action has magical power that makes the thing that we desire realize. Also, in (100a), by wishing for something, we will get the one because wishing has the power. In other words, *wish* has a performative meaning that the action of wishing invites some force that makes the desire come true. However, even in this performative sense, *wish* does not have the meaning of transfer because there is no third person who receives the wished thing.

Nevertheless, because of the performative meaning of *wish,* if we wish something for the benefit of someone, we expect that the person will receive it. In this sense, *wish* can occur in the DC as in (101).

(101) We *wish* you a merry Christmas. (BNC_KDE)

In the DC, *wish* functions as a speech act verb: by saying the expression, the event designated by the expression is performed. By uttering the expression (101), the wish on a merry Christmas is transferred to the Recipient, *you*, so you can have or experience it. When occurring in the DC, *wish* functions like a verb of communication like *tell* in that to tell means to metaphorically transfer a message to someone and to wish means to metaphorically transfer a wish to someone.

In short, even if *wish* does not have the meaning of transfer on its own, when it occurs in the DC, we coerce it: *wish* becomes a speech act verb so we can transfer the wish to the Recipient.

As the result of the corpus analysis shows, *wish* could be used with the DC because of the performative meaning of *wish*. A caveat is that three out of four instances were 'we wish you a merry Christmas,' which was a repeated phrase of a Christmas carol.[39] Because of the repeated expression in the carol, the collostruction strength became stronger. Therefore, when *wish* appears in other corpora, it could be associated with the DC not as frequently as in this corpus. In order to investigate more about coercion of *wish*, I will examine the processing time and acceptability judgments through experiments in Chapter 5.

4.3.2.7. Verbs of general causation

Cause generally means to 'make something happen' (CCELD). This verb can occur in a monotransitive construction as in (102).

(102) … he's gonna *cause* chaos… (BNC_KP1)

Since there is no other participant than *he* and the caused event *chaos*, transfer cannot occur.

However, this verb also occurs in the DC as in (103).

---

[39] The other instance was 'But he woke me up this morning to wish me a happy anniversary.'(BNC_KDE)

(103) I hope this doesn't *cause* you a problem, but the rates of benefit have changed very slightly since the first of October ninety one. (BNC_KE3)

In (103), the people were talking about benefit rates of income support and the conditions for the reduced benefit rates. The Agent of *cause*, *this*, indicates his/her statement expressed in the following clause (i.e. pointing out that the rates of benefit are slightly different since October 01, 1991). The speaker of (103) hopes that this statement does not result in problems when the interlocutors understand the benefit rates.

In the expression of (103), there are several metaphors involved. First, *this* indicates the statement of the speaker about the changed benefit rates.' This statement is conceptualized as an entity that could potentially cause a problem. Second, *you* designates the person that would be affected by the potential caused problem. Thus, *you* is conceptualized as the person who receives the problem. Third, *a problem* is a consequence that can be potentially caused by the statement about the changed benefit, but in (103), it is conceptualized as an entity that is created by the statement about the changed benefit, and this created problem is transferred to the Recipient, *you*. With the Agent and the Patient conceptualized as entities through metaphor, the causing event in the DC is conceptualized as the following: the statement about the changed rates creates a problem and *you*, the Recipient, receives the problem. Through a few metaphors involved, when *cause* occurs in the DC, the expression is coerced to mean metaphorical transfer: *this* creates *a problem* and causes *you* to receive it.

Note that when *cause* occurs in the DC as in (103), the whole expression does not have a benefactive meaning, while other instances of the DC such as verbs inherently signifying giving, creations verbs, obtaining verbs, and verbs of ballistic motion have a benefactive meaning. When verbs like *give, tell, send, cook, find*, and *throw* are used in the DC, the Recipient is benefited by receiving the Patient. However, when *cause* occurs in the DC, by receiving a problem, the Recipient is affected negatively.

The lack of the benefactive meaning in the DC in (103) is probably because the Patient noun of *cause* is semantically restricted as a negative event. Even in a monotransitive construction, the verb *cause* occurs with the Patient noun of a negative connotation such as *chaos*, *problem*, and *trouble*. For example, when *cause* is used with *trouble* as in (104a), the sentence is natural while (104b) is less natural because the Patient *happiness* has a positive connotation. Also, the Patient noun occurring with *cause* is a type of event (i.e. something that happens), not an entity such as *book*, *computer* as we can see that (104c) is the least natural.

(104) a. He *caused* a <u>trouble</u>.

b. ?? He *caused* <u>happiness</u>.

c. *He *caused* a <u>book</u>.

The semantic restriction of *cause* on its Patient are still applied when they occur in the DC. When *cause* occurs with *trouble* in the DC, the whole expression sounds natural as in (105a), when the Patient is *happiness* as in (105b), it is less natural, and when the Patient is *book* as in (105c), it is the least natural.

(105) a. He *caused* me a <u>trouble</u>.

b. ?? He *caused* me <u>happiness</u>.

c. *He *caused* me a book.

The examples in (105) show that in order for a verb, which usually occurs in the monotransitive construction, to occur in the DC, the semantic restrictions of the arguments occurring with the verb are expected to be satisfied first. In the case of *cause*, when the semantic restrictions on *cause* are sati fied, the verb meaning can be coerced to have a transfer meaning through a few metaphors demonstrated above. However, as I stated earlier, the benefactive meaning of the DC is overridden in the way that the caused event affects the Recipient negatively due the semantic restrictions of *cause* on its argument. The coercion of *cause* suggests that the meaning of the construction also can be overridden by the verb meaning.

Cause is interesting in two points. First, it shows that coercion in the DC can occur only when the semantic restrictions of the nouns are satisfied in the monotrantive construction. Second, coercion has been defined that the meaning of the verb is overridden by the constructional meaning when their incompatible meanings are resolved. However, *cause* in the DC is the case where the benefactive meaning of the DC is overridden. Since the meaning of the DC has to be overridden, which is not a usual case of coercion, I predict that when cause occurs in the DC, people will take more processing time.

4.3.2.8. Verbs of portion transfer

The last verb subclass that is less frequently associated with the DC is the ‘verbs of portion transfer’ such as *pour* and *scoop*. These verbs are similar with the creation verbs in that they indicate an action of preparing a drink or food. For this reason, Pinker (1989) classified *pour* as a creation verb especially when it occurs in the DC.

However, the central meaning of the verbs of portion transfer is different from the creation verbs. The creation verbs indicate an action of creating food by using different materials while the verbs of portion transfer indicate an action of causing some portions of a material to move as in (106).

(106) a. If you *pour* boiling water on ordinary glass, it will probably crack. (BNC_KCD)

b. You have to *scoop* it [cheese cake] out with your fingers. (BNC_KB9)

In both cases, a portion of the Patient such as *water* or *cheese cake* is transferred but neither verb has the meaning of transfer to 'a Recipient.' In (106a), there is no Recipient who receives the poured water, and in (106b), the Recipient is not specified: the scooped portion of the cheese cake may be eaten by the Agent herself or it may be transferred to another person who is not salient. In both cases, the verbs describe the means by which the portion was transferred.

When such verbs occur in the DC as in (107), they are coerced into the meaning of 'transfer of the portion to a Recipient.'

(107) a. I said, *pour* us a tea. (BNC_KCY)

b. …she *scoop* me the tuna fish… (BNC_KB9)

In (107a), the Agent, *you* (which is evoked by the imperative construction), prepares a tea for the Recipient *us* and transfers it to the Recipient. In this sentence, the tea will be poured into a container that the Recipient will have. In (107b), *she* prepares the tuna fish and transfers its portion to the Recipient, *me*, by using a scoop.

Since outside of the DC, in the event scene of the verbs of portion transfer, there are two salient participants and thus, they do not carry the meaning of 'transfer of possession to the Recipient,' it is not semantically very compatible with the DC. Therefore, they were not as frequently associated with the DC as the verbs inherently signifying giving.

4.3.2.9. Other verbs

Sort out is another case of coercion. It is often used in a transitive construction as in (108) in the meaning 'to organize and tidy in order.'

(108) Look, we've got to *sort* your bedroom *out* first. (BNC_KE3)

In this usage, *sort out* indicates the action of arranging, and therefore, it does not carry the meaning of transfer.

This verb is used in the DC in the corpus as in (109).

(109) … they were going to *sort* you *out* some tickets, weren't they? (BNC_KDE)

In this example, the Agent, *they,* arrange *some tickets* so the Recipient, *you,* can receive them. The Agent will purchase the tickets or make the tickets available for the Recipient by any means, and the Recipient will receive the tickets either directly from the Agent or indirectly through delivery or from some other person. Therefore, the central meaning of *sort out*, which is 'to arrange' is interpreted as an event prior to transfer.

It also has a benefactive meaning. The action of 'sorting out the tickets' is conceptualized as a transferred entity. Therefore, this sentence is interpreted as 'they were going to sort out some tickets for the benefit of her.'

As I expected in Chapter 2, the action of sort out does not damage the Patient, the tickets. Therefore, the Patient can be transferred to the Recipient when the verb occurs in the DC. Therefore, as one of the 'verbs of possible transfer' discussed in Chapter 2, *sort out* can occur with the DC via coercion though it is not perfectly compatible with the DC.

4.3.2.10. Coercion

In 4.3.2, so far, I have examined the semantics of the verbs that are less frequently associated with the DC. The verbs are classified into several verb subclasses based on their semantic properties, but they share similar characteristics as the followings.

First, these verbs do not require a salient Recipient in the event scene and therefore, there is no meaning of transfer of possession between the Agent and the Recipient. This semantic characteristic of these verbs is associated with the syntactic characteristics: these verbs occur in other constructions. For example, *refuse* and *deny* occur in a clausal complement construction as in *He denies that the saw it*. The verbs like *cook* and *pour* occur in a monotransitive construction as in *you pour boiling water on ordinary glass*, and *run* occurs in an intransitive construction as in *I always used to run*.

Second, the condition of the Patient resulting from the action designated by the verbs is intact. Therefore, when these verbs occur in the DC, the verb meaning is coerced into the transfer meaning.

However, the coercion process and the interpretation are slightly different among the verbs.

First, the prototypical meaning of the ballistic motion verbs such as *throw* and *drop* is coerced into the means of transfer. They are interpreted as means of transfer because the throwing event and dropping events can occur simultaneously with the transferring event. For example, in both throwing event and transferring event, the Patient leaves the Agent and moves to somewhere. Therefore, when the verb meaning 'to throw' and 'to drop' is coerced to the meaning of the construction 'to transfer,' the verb's central meaning is interpreted as the means of transfer.

Second, the meaning of creation verbs (e.g. *cook*), obtaining verbs (e.g. *find*), and verbs of portion transfer (e.g. *pour*) can be interpreted as an event prior to transfer. The event designated by these verbs cannot occur simultaneously with the transferring event. In the events of cooking, finding, and pouring, the Agent makes the Patient come to the Agent's dominion. However, in the meaning of the DC, the Patient leaves the Agent's dominion and goes to the Recipient's dominion. Therefore, the central meaning of all these verbs cannot occur simultaneously with the event of transfer. Instead, it is interpreted to be an event prior to the transfer.

When the verbs, above mentioned, are coerced, they usually carry not only the meaning of physical transfer but also the meaning of metaphorical transfer, i.e. the benefactive meaning, due to the meaning of DC, where the Recipient is usually benefited by receiving something

Third, when refusal verbs occur in the DC, they indicate 'to prevent transfer,' and therefore, transfer does not occur. These verbs inherently have the meaning of 'not allowing to do an action' or 'performing a speech action that negates a proposition.' Therefore, their central sense affects the transfer event in the way of preventing transfer.

Last, some verbs show different ways of coercion. *Wish* does not have the meaning of transfer on its own, but when it occurs in the DC, *wish* becomes a speech act verb so we can transfer the Agent's wish to the Recipient. *Cause* is interesting in that it can occur in the DC when the Patient is an abstract event which has a negative connotation. Because of the negative connotation of the Patient, when it occurs in the DC, the benefactive meaning of the DC is overridden.

In conclusion, as I expected in Chapter 3, the verbs in the subclasses that are not compatible with the DC occur less frequently, and we could see that some degree of coercion is involved in order for them to occur in the DC. I claim that the verbs that are less frequently associated with the DC have similar semantics but the way they are coerced and the resulting interpretation differ.

4.3.3. Verbs in which semantic compatibility and frequency show different patterns

If the semantic compatibility and frequency were perfectly correlated, the verbs in the same subclass should be associated with similar collostruction strength. However, the correlation predicted by the usage-based model is not perfect correlation, but general correlation. Therefore, we can expect that there are some discrepancies of the correlation that some semantically compatible verbs do not frequently occur with the DC and vice versa. Truly, in the corpus that I examined, there were some verb subclasses within which some verbs were more frequently associated with the DC while the others are less frequently associated with the DC. I will examine these subclasses in this section.

4.3.3.1. Verbs of future having

The verbs in the 'verbs of future having' do not show similar patterns regarding the frequency association with the DC. They span from higher ranks (*owe, promise*, and *save*) to lower ranks (*leave* and *allow*) (c.f. Figure 9). I expected in section 3.2.2.1 that the 'verbs of future having' are semantically compatible with the DC, and thus they are expected to occur with the DC frequently.

Owe, one of the future having verbs, occurs frequently with the DC (ranked at 6).

(110) You *owe* me five pound. (BNC_KCA)

In (110), the Agent, *you*, has to give the Patient, *five pound*, to the Recipient, *me*, in the future. Since there are three salient participants (i.e. the Agent, the Patient, and the Recipient) in the event scene of *owe* and transfer of possession will occur in the future, *owe* is semantically compatible with the DC. As the corpus analysis shows, it is frequently associated with the DC.

Let us examine *promise*, *save, leave*, and *allow*. Pinker categorizes these verbs as 'future having verbs,' and they actually occur in the DC as in (111a) and (112a).

(111) a. I did *promise* you a doggy, didn't I? (BNC_KD5)

b. You can borrow it as long as you *promise* to bring it back. (BNC_KD5)

c. Steve *promised* he would get them all transcribed. (BNC_KPV)

(112) a. We're just trying to *save* you money, you see! (BNC_KB9)

b. I've been *saving* five pounds a week. (BNC_KBF)

c. How was it that Jesus *saves* us… (BNC_KBX)

Note, however, that they mean ‘future having’ only in the DC. They do not have to mean transfer at all when used in other constructions as in (111b), (111c), (112b), and (112c). These verbs tend to occur in other constructions more frequently that than in the DC. For example, *promise* is more often used with a clausal complement (Biber et al. 1999) (see below for more exact frequency information). If we assume that the central meaning of these verbs is not “future having,” they are not very semantically compatible with the DC. Then, they do not have to be expected to occur frequently with the DC. In the corpus, *leave* and *allow* are not frequently associated with the DC, which follows the correlation pattern. However, *promise* and *save* are relatively frequently associated with the DC as seen in Table 11. Let us examine the semantics and coercion of *promise* and *save* in more detail.

Promise can be used not only in the DC as in (111a) but also with the *to*-infinitive clausal complement as in (111b) and sentential complement as in (111c). As stated earlier, *promise* is more often used with a clausal complement (Biber et al. 1999). In this corpus, out of 36 instances of *promise*, 4 instances were used with the DC while 20 instances were used with the clausal complement. 12 instances did not have a complement which indicates the promised event as in the cases like ‘I promise’ or ‘I promised him.’ The promised event is previously described or known to the interlocutors.

When this verb occurs with the DC, the sentence is interpreted as ‘the Agent promises another person that she will cause an event of “giving an entity to him” to occur.’ Through the metonymy OBJECT FOR AN ACTION IN WHICH THE OBJECT IS INVOLVED, the event of ‘giving a doggy’ is expressed as an entity *doggy* in (111a).

Therefore, I claim that even though highly ranked, *promise* occurring in the DC involves a certain amount of coercion.

Also, *save* can be used in the DC as in (112a), but does not have to mean transfer if it is used with other constructions as in (112b) and (112c). Unless it is used in the DC, this verb often means that the Agent collects money gradually in order to use it (CCED_AL) as in (112b) or help another person avoid an unpleasant event as in (112c). I also claim that *save,* which occurs in the DC as in (112a), is another case of coercion where the meaning 'collecting money' is coerced to mean "transfer": to save money so that we can give it to you.

If *promise* and *save* are not semantically compatible with the DC, their frequent association with the DC is unexpected. Since the result of collexeme analysis can be affected by what corpus I use, *promise* and *save* may be highly ranked especially in this corpus. The coercion of *promise* and *save* will be discussed more through the experiments: if the use of *promise* and *save* are processed relatively slow, we can say that coercion is involved.

4.3.3.2. Verbs of placement

Verbs of placement were not discussed in the semantic analysis of compatibility in Chapter 3. However, they actually occur in the DC and they do not show a similar pattern regarding collostruction strength. For example, *put* is ranked in the position of 10 while *set* is ranked in 39. Both verbs typically mean "to place something on a particular location" outside of the DC. They are usually used with a locative argument as in (113).

(113) a. I'll *put* them [sausages] in the freezer. (KB0)

b. …but in the corner, you've got a piece of concrete. / Concrete? / and ceramic tiles *set* on it. (KDW)

In (113a), *put* is used with a locative argument *in the freezer* and *put* means 'to move the sausages into the freezer.' *Set* in (113b) means 'to place ceramic tiles on the concrete.' There is no Recipient in both examples but transfer occurs from the Agent to the Location. The difference between the verbs of placement and the verbs of ballistic motion is that the former requires a goal to which the Patient goes whereas the latter does not as we have examined in 3.2.2.2.

I claim that when the verbs of placement are used in the DC, a metaphor is involved: a location where an entity is placed is understood as a person who receives the entity. Let us examine the following sentences.

(114) a. Well what I do with Matthew is, I *put* him the lettuce and tomato and celery in one portion… (BNC_KDW)

b. Well for English literature they *set* you so many books to study, ... (BNC_KCD)

In (114a), the actual location to which the vegetables will be placed may be a plate or a bowl. Due to the metonymy PART FOR WHOLE, both the container and the contained material are expressed by the contained material. Once they are put in the container, they will be transferred to *him* with the container. *He* is the ultimate location where the vegetables are transferred, and it is understood as the Recipient in the DC. In (114b), *so many books to study* are not physically transferred to *you*. What is transferred is ‘the requirement to study many books.’ Via the metonymy OBJECT FOR AN ACTION IN WHICH THE OBJECT IS INVOLVED, this requirement to study many books is understood as the many books. The location to which the order is transferred is understood as the Recipient, *you*.

In sum, the third participant salient in the scene of put and set is a Location, rather than a Recipient. Therefore, when these verbs occur in the DC, the Location is coerced to the Recipient. The condition of the Patient resulting from the putting action is intact. Therefore, I claim that the verbs of placement belong to the semantic compatibility category of “verbs of possible transfer” to which verbs such as *cook, find*, and *throw* belong. However, *put* is more strongly associated with the DC than *cook, find*, and *throw,* whereas *set* is not. This result may be limited to this corpus only. I will examine the processing aspect of these verbs in Chapter 5 for further investigation.

4.3.3.3. Other verbs

The next verb to be examined is *hire*. *Hire* can be used to indicate ‘to employ’ when the object is a human being as in (115a). In British English, the object can be a non-human as in (115b) and it means ‘to pay to the owner of an object in order to use it for a period of time’ (CCED_AL), which is equivalent to *rent* in American English.

(115) a. So the Queen would *hire* a nanny to look after them. (BNC_KCN)

b. I mean, did we even *hire* shirts? (BNC_KBC)

I classified this verb as an obtaining verb because its meaning is similar with the meaning of *buy* in that the Agent obtains an entity or a person in exchange of money. When the hired or rented thing is an entity, the difference from *buy* is that the Agent possesses the entity only for a certain period of time and the actual ownership does not change.

In these examples above, the Agent obtains a person or an entity in exchange of money. In (115a), the *Queen* metaphorically possesses the *nanny* by obtaining the person by paying wages. *Hire* in (115b) indicates a physical and temporary possession and transfer occurs from the owner to the person hiring the shirts while the money is transferred from the person hiring to the owner. In this sense, *hire* is a commercial transaction verb. However, neither example specifies nor profiles the previous owner although implicitly invoked.

Note that *hire* and *rent* can be used not only to indicate 'to take and use for a period of time by paying money' as in (115b) above but also to indicate 'to allow someone to take and use for a period of time by being paid' as in (116) below.

(116) a. Grounds that I can fight back on is that they *hired* a car to me knowing that I was an Australian. (http://phorums.com.au/showthread.php?94162-Re-An-Australian-involved-in-a-car-accident-in-America)

b. Then I learned that nobody would *rent* an apartment to me because of the bankruptcy. (http://www.back2college.com/lawschool.htm)

In other words, the semantic roles of *hire* and *rent* of (115b) are different from those of (116). In (115b), the subject, *we,* plays a role of Recipient who obtains the Patient (*shirts*) in exchange of money and the Patient is transferred from the implicit owner 'to' the subject (*we*). On the other hand, in (116), the subject (*they* and *nobody*) is the original owner and the Recipient who obtains the Patient (*me*) is expressed in a

PP. The Patient is transferred 'from' the subject (owner, the Agent) to the Recipient in the PP.

Hire occurring in the DC selects the argument following the pattern of (116): the subject is the owner, the Agent, and the Patient is transferred from the Agent to the Recipient. Let us examine (117).

(117) Cos I think last time we *hired* them [road signs] from Staffordshire and I'd have thought if they're going to buy some they will be very happy to *hire* us them [road signs]. (BNC_KD8)

There are two *hire*s in this example, and the second one is used in the DC. The second *hire* is used to indicate 'rent the signs to us.' The subject of *hire* is *they*, which is the owner of the Patient (*them*, the road signs), the first object is *us*, the Recipient, and the second object is *them*, the Patient. The Patient is transferred from the owner, *they,* to *us.* Note that in the DC, the Recipient is expressed as the first object of *hire*, while it is expressed in the PP in the case of the construction with the *to*-PP as in (116).

Hire needs more study of experiments for the following reasons. First, even though there are three participants in the event scene, which are a person who gives, a person who obtains, and a thing which is transferred, the semantic roles are considerably different depending on the context. Also, it is not frequently associated with the DC. I will examine how speakers judge the acceptability of the collocation and how they process it. If speakers judge the co-occurrence acceptable and process it fast, the co-occurrence may not be regarded as not involving great amount of coercion. If so, low rank of collexeme analysis may be limited to this particular corpus only. Second, in American English, *hire* in the meaning of 'to rent' is unusual. When I conduct an experiment, I will test *rent* instead of *hire*, considering the dialect difference.

Another verb to be examined is *provide*. The semantic property of *provide* is similar with those of the verbs of fulfilling discussed in (69) in Chapter 3. The verb has the meaning that the Agent gives a Patient to the Recipient who needs it. Pinker (1989) proposed that the verbs of fulfilling does not occur in the DC, but as we can see from the corpus, *provide* can be used although the frequency association is not very strong. This verb occurs with the DC as in (118).

(118) …district council might […] *provide* them [elders] all services of worship… (BNC_KB0)

In (118), the Agent is *district council*, the Recipient is *them*, and the Patient is *all services of worship*. And the Patient is transferred to the Recipient metaphorically.

The fact that there are three participants in the event scene and transfer occurs is similar with other verbs which are frequently associated with the DC such as 'verbs inherently signifying giving.' Nevertheless, *provide* is often used in a monotransitive sentences as the following sentences.

(119) a. …the second section we are looking at news coverage which is very sketchy, erm, it doesn't *provide* a complete picture at all. (BNC_KBX)

b. He'd *provide* Gwyneth with three machines… (BNC_KD8)

In (119a), the object of *provide* is the Patient that is metaphorically transferred to 'us' although the Recipient 'us' is not linguistically expressed. On the other hand, in (119b), the Recipient is expressed as an object while the Patient is an oblique. However, realizing both the Recipient and the Patient as the objects of the verb as in the DC does not seem very frequent according to the collexeme analysis. I will examine the experiment of the acceptability and processing in order to find more about the coercion of *provide*.

4.3.3.4. Verbs that are expected not to occur with the DC

As I stated in 3.3, Pinker (1989) claimed that verbs of fulfilling (*present, credit, entrust/trust, supply*), verbs of continuous causation of accompanied motion in some manner (*pull, carry, push, schlep, lift, lower, haul*), verbs of manner of speaking (*shout, scream, murmur, whisper, yodel*), verbs of proposition and propositional attitude (*say, assert, question, claim, doubt*), and verbs of choosing (*choose, pick, select, favor, indicate*) do not occur in the DC. Truly, these verbs do not occur in the corpus at all except for *provide* as I discussed in 4.3.3.3.

I searched for instances in which these verbs and the DC co-occur through google search, and I found that they can be used together.

(120) Verbs of fulfilling

- … the Franklin Institute *presented* him the Howard Potts Medal (1925). (nobelprize.org/nobel.../wilson-bio.html)

(121) Verbs of continuous causation of accompanied motion in some manner

- … after the ladies had gone out he *pushed* him the wine (Henry James, *Washington Square*

(122) Verbs of manner of speaking

- I *whispered* her a promise (www.milldogrescue.org/Lily_Tribute.html)

(123) Verbs of proposition and propositional attitude

- John Grady *said* him a good afternoon (Cormac McCarthy, *All the Pretty Horses*)

(124) Verbs of choosing

- Then he *chose* him a nice gravestone for a seat (www.kidsgen.com/.../sprightly_tailor.htm)

In 3.3, I discussed the morpho-phonemic and semantic reasons why these verbs do not occur in the DC. However, as we can see from (120) to (124), they can co-occur with the DC.

There are also verbs that are expected not to occur in the corpus very frequently with the DC: they are the verbs of impossible transfer, discussed in 3.2.2.4, such as *kill*. If these verbs ever occur with the DC in the corpus, we can say that people can coerce these verbs. Since they do not occur in this data set at all, our analysis on semantics might be correct that they are not very compatible with the DC.

Regarding the verbs that are not expected to occur with the verbs frequently, I will also examine them from the aspect of processing as well. If the use of these verbs with the DC is judged to be totally unacceptable, this implies that the attempt for coercion fails because the semantic conflict cannot be resolved. If it is judged to be somewhat acceptable, it implies that some degree of coercion is involved and people will take more processing time. I will discuss the semantics of these verbs in more detail based on the experiments.

4.4. Collexeme Analysis of ANC

As I stated in 4.1, the participants for the experiment will be speakers of

American English. I will correlate the frequency pattern resulting from the BNC with the results from the experiments obtained from American English speakers. In order to do so, the frequency pattern of American English should be similar with that of British English.

In this section, I will present the result of the collexeme analysis conducted on a part of ANC (Charlotte) in Table 13 and compare the frequency pattern shown in ANC with that shown in the BNC discussed in 4.3.

Rank	Verb	Uses in DC	Number of Instance	*p*-value	Collo_Strength
1	*tell*	89	667	2.07E-85	84.68455611
2	*give*	57	141	7.52E-84	83.12354673
3	*buy*	9	63	1.88E-09	8.725558832
4	*teach*	6	43	1.18E-06	5.928436314
5	*ask*	9	140	2.04E-06	5.689421367
6	*sell*	5	34	7.28E-06	5.137671173
7	*show*	5	38	1.28E-05	4.892780306
8	*provide*	1	2	0.015975	1.796561588
9	*bring*	3	67	0.016724	1.776659266
10	*hand*	1	3	0.023867	1.622204732
11	*lend*	1	3	0.023867	1.622204732
12	*pay*	2	32	0.027114	1.566811118
13	*tie*	1	8	0.062392	1.204873808
14	*drop*	1	14	0.106629	0.972125841
15	*sing*	1	14	0.106629	0.972125841
16	*send*	1	31	0.221003	0.655601308
17	*build*	1	54	0.352889	0.452362341
18	*read*	4	395	0.562825	0.249626599
19	*get*	11	1246	0.743238	0.128872251
20	*leave*	1	140	1	0
20	*make*	2	362	1	0

Table 13. Verbs that occur with the ditransitive construction, ordered by the collostruction strength

I classified the verbs in Table 13 according to the verb semantics. The classification is presented in Figure 10 with the rank of each verb in parentheses.

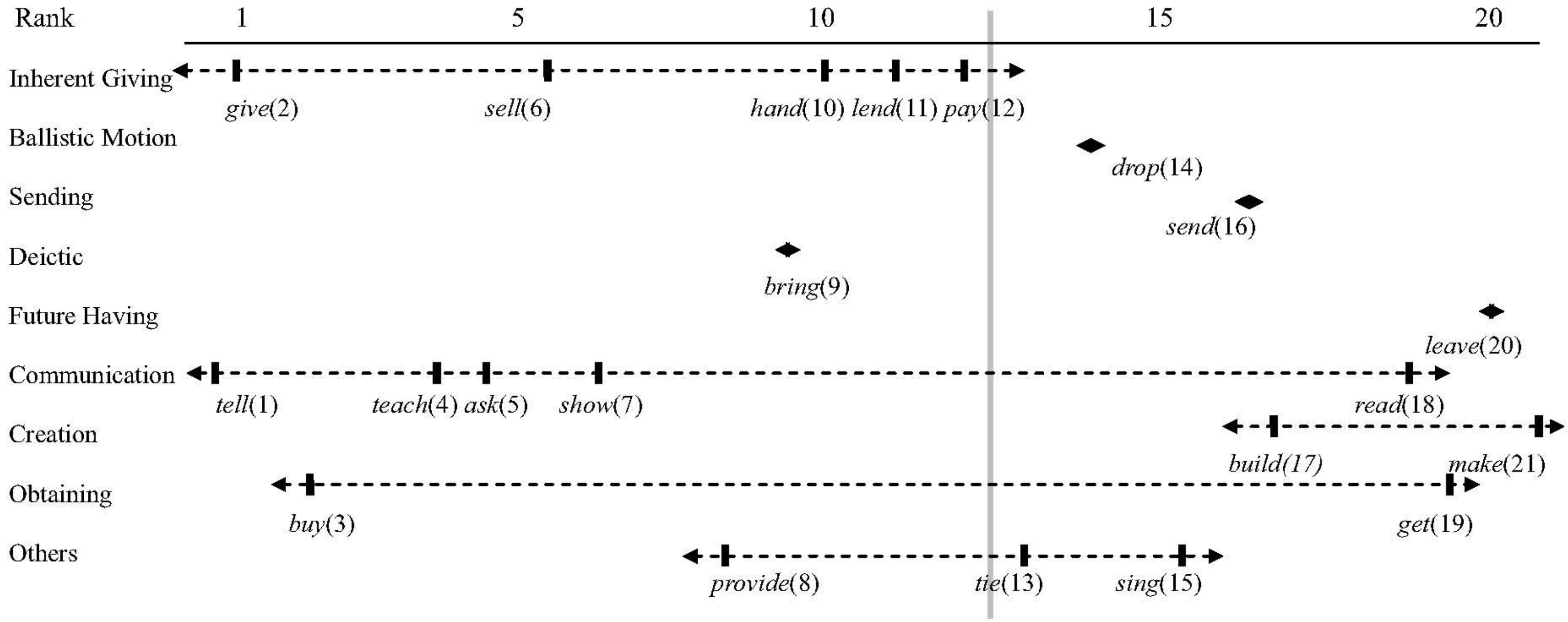

Figure 10. Classification of the verbs that occur with the DC

We can again roughly divide the subclasses into verbs more frequently associated with the DC and verbs less frequently associated with the DC. The boundary is the *p*-value of .05, represented by the vertical gray line in Figure 10. As in the analysis on a part of BNC spoken corpus, we can see a pattern in Figure 10 that certain verb subclasses are more highly ranked (i.e. more strongly associated with the DC) than other verb subclasses. The verbs are divided as follows in (125) and (126).

(125) Verbs more frequently associated with the DC

a. Verbs inherently signifying giving: *give, sell, hand, lend, pay*

b. Verbs of communication: *tell, teach, ask, show, read*

c. Deictic verbs: *bring*

(126) Verbs less frequently associated with the DC

a. Sending verbs: *send*

b. Verbs of creation: *build, make*

c. Verbs of obtaining: *buy, get*

d. Verbs of ballistic motion: *drop*

e. Verbs of future having: *leave*

f. Others: *provide, sing, tie*

When we look at the result of collexeme analysis in Figure 10, we can see common patterns with the one on the BNC conversation corpus. First, most verbs occurring with the DC in Charlotte overlap the verbs occurring with the DC in the BNC conversation. Only two verbs occur in Charlotte but not in the BNC: *sing* and *tie*.

Second, the patterns of association strength of each verb subclasses in Charlotte are almost the same as those in the part of the BNC conversation corpus. Verbs inherently signifying giving, verbs of communication, and deictic verbs are frequently associated with the DC both in Charlotte and BNC. On the other hand, verbs of creation and verbs of ballistic motion are less frequently associated with the DC both in Charlotte and BNC. Also, among the future having verbs, *leave* is less frequently associated with the DC in both corpora. Among the verbs of obtaining, *buy* is frequently associated with the DC while *get* is not in both corpora.

These commonalities show that the frequency pattern is very similar across the corpora, and we can conclude that British English and American English show similar pattern regarding the association between verbs and the DC. Therefore, I can correlate the result of frequency analysis from the BNC conversation corpus with the experiment result obtained from American English speakers.

However, there are cases that should be handled with caution. First, the verb *send* is ranked low in Charlotte whereas it is highly ranked in the BNC spoken. Examining dative alternation of the constructions [V NP NP] and [V NP PP], Bresnan and Ford (2010) analyzed the corpus model which is built based on American English Corpus (Switchboard corpus of telephone conversation). They reported that *send* is more likely to occur with the prepositional construction [V NP PP] than the DC [V NP NP] (c.f. Table 1 in Bresnan and Ford 2010). This suggests that *send* may not be as strongly associated with the DC in American English as in British English.

Second, *provide* is highly ranked in Charlotte while it is ranked low in the BNC. As one of the verbs of fulfilling, it is not expected to be frequently associated with the DC. It was indeed not frequently associated with the DC according to the analysis of BNC spoken. However, it was frequently associated with the DC in the Charlotte analysis. This verb needs to be tested in the experiment.

Third, there are verbs that occur with the DC in the BNC spoken corpus but do not occur with the DC in Charlotte such as *spin, hire, cook*, and *run*. Most of these verbs are less frequently associated with the DC. Since these verbs do not occur with the DC frequently, they are not likely to occur with the DC in the small corpus. If they ever occur with the DC, they are expected to be ranked low. Therefore, when these verbs are tested in the processing experiment, I predict that it will take more processing time because of coercion.

In conclusion, when correlating the semantic compatibility, frequency, processing time and acceptability judgments, I will use the result of the collexeme analysis of the BNC conversation corpus, assuming that British English and American English show similar frequency patterns regarding the co-occurrence of verbs and the DC. When the results of collexeme analysis of the two corpora are contradictory, I will exclude those verbs from the experiments or I will further test them through experiments.

4.5. Conclusion

The result from the collexeme analysis was generally correlated with the result from the semantic analysis on compatibility. The verbs frequently associated with the DC were indeed those that were first noticed to be semantically compatible with the DC, while those that are not frequently associated with the DC in the corpus were not very semantically compatible.

The verbs that are more frequently associated with the DC are 'verbs inherently signifying giving,' 'sending verbs,' 'deictic verbs,' 'verbs of future having,' 'communication verbs,' and 'verbs of instrument of communication.' Although there are differences in detailed semantics among these verb subclasses, all of them share a common semantics: there are three participants, an Agent, a Patient, and a Recipient.

Transfer of possession occurs between the Agent and the Recipient.

The shared sense presented above is almost identical with the meaning of *give*, which does not specify any manner or process of transfer. Also, this meaning of *give* contains much of the content of the meaning of the DC: it profiles the event of causing another person to receive an entity, and schematically evokes the same semantic role as appear in the construction. Therefore, *give* is the most compatible with the DC and the most strongly associated with the DC. When the verb meaning specifies the manner, instrument, process, or result of transfer, the verb is less strongly associated with the DC.

On the other hand, in the group that are less attracted to the DC, there are ballistic motion verbs, creation verbs, obtaining verbs, refusal verbs, intransitive verbs, verbs of hope, general causation verbs, and portion transfer verbs. In the event scene of these verbs, there are only one or two salient participants evoked when used in the central meaning: the Agent or the Agent and the Patient. The third participant, Recipient, is not necessarily salient. Since there is no person who receives the Patient, transfer of possession cannot occur in the central sense. In addition, the condition of the Patient resulting from the action designated by the verb is intact.

Therefore, when these verbs occur in the DC, the central meaning of these verbs is coerced into involving transfer. There are various ways of coercion. For example, the central meaning of the verb and the transfer meaning are conceptualized as consecutive events. Or the basic meaning of the verb is conceived as a means of transfer. Metaphors and metonymies can be involved. Or, even if transfer meaning is involved, the transfer is prevented by the basic meaning of the verb. A benefactive interpretation is involved in most cases, but in some cases like *cause*, this constructional meaning can be overridden due to the negative connotation of the

Patient.

The usage-based model predicts that the linguistic knowledge about semantic compatibility between a verb and a construction and frequency are correlated. The collostrucional analysis provides evidence for this assumption. If the verb and the construction frequently co-occur in usage, the meaning of the verb and the meaning of the construction are more compatible. Verbs that do not seem to be compatible with a particular construction can actually be used in reality but the two units are not used together frequently. When these two units co-occur, coercion is involved in order to resolve the conflict between the verb meaning and the constructional meaning.

However, note that there are various degrees of association strength. It means that it is not easy to draw a sharp boundary between the verbs that are compatible and used frequently with the DC and the verbs that are incompatible and not used frequently with the DC. Therefore, we cannot simply say that coercion occurs or coercion does not occur. Instead, we can say that some verbs may require greater coercion in order for them to occur in the DC because the verb meaning is less compatible with the meaning of the DC and some verbs need less great coercion when it occurs in the DC because its meaning is more compatible with the meaning of the DC.

The collexeme analysis shows the aspect of frequency and I tried to explain how coercion is achieved in the cases where the verb is not very frequently associated with the DC. However, as I have mentioned various times in this chapter, some results of the collexeme analysis may be specific to this corpus. Also, corpus data shows only the verbs that “can” occur in the DC. It does not show us which verbs are very hard to be coerced, and thus, very unlikely to occur in the DC.

Moreover, coercion is not just a phenomenon explained only from the view of the linguistic knowledge of semantic compatibility or only from the view of frequency of usage. In order to understand coercion better, we need to look at the psychological aspect of how people judge the acceptability of the coerced expressions and how easily they process them. If coercion is a gradient concept as the semantic compatibility analysis and the collexeme analysis show, then, some verbs will be easier to be coerced and be more acceptable when occurring with the construction. Therefore, in the next chapter, I will conduct an experiment to obtain the data of acceptability judgments and processing effort.

5. Analysis of Experiments on the English Ditransitive Construction

The aim of the experiment is to obtain processing time and the scores of the acceptability judgments of the co-occurrence of the DC and various verbs. The prediction of the usage-based model is that the semantic compatibility between a construction and the verbs that occurs in the construction, frequency of the co-occurrence of the construction and the verbs, the acceptability judgments on their co-occurrence, and the processing difficulty of their co-occurrence are all correlated in general (Kemmer 2008). Following this prediction, in Chapter 4, I showed that semantically more compatible verbs with the DC tend to be more frequently associated with the DC, according to the collexeme analysis. In this chapter, I will correlate processing time and acceptability judgment with the semantic compatibility and the frequency pattern that I discussed in previous chapters.

The prediction is that when a verb semantically compatible with the DC occurs in the DC, people do not have to take much processing effort because there is no or very little semantic conflict between the two units. On the other hand, in order for verbs semantically less compatible with the DC to occur in the DC, people have to resolve this incompatibility. If there is more incompatibility, it will be harder to resolve the incompatibility. In other words, greater coercion is expected. Therefore, I expect that people have to take more effort to process the co-occurrence of incompatible verbs and the DC.

For the acceptability judgments on the co-occurrence of a lexical item and the DC, the participants were asked the “naturalness” of the sentences as in the experiment of the SCC, previously discussed in 2.3. When judging naturalness of the sentence, people need to process and comprehend the sentence, first. If they processed the sentence easily, they feel the sentence natural. If they hesitated at some point while there were processing the sentence, they may judge the sentence rather unnatural. They will also take frequency into consideration: if they have heard or spoken the co-occurrence of the verb and the DC frequently, they are likely to judge the sentence natural because the activation is routinized. Consequently, I claim that the naturalness of the sentences is judged based on not only the semantic compatibility, but also frequency and processing effort.

In this chapter, I will correlate the semantic compatibility and the frequency with the processing time and the acceptability judgments resulted from the experiment. Next, I will carefully examine how the semantics of individual verbs and the construction influenced on the processing time and the acceptability judgments. Also, if the verb is not semantically compatible with the construction, I will analyze how the incompatibility can be resolved.

5.1. Experimental Design

5.1.1. Material of the Experiment

In Chapter 2, I obtained the acceptability judgments data by asking the naturalness of the stimuli sentences in the form the survey and by incorporating it in the processing experiment. In the survey, the participants read a sentence presented on the screen as a whole sentence and judged the naturalness of the sentence. There was also ranking tasks (c.f. 2.2). In the processing experiment, the participants read a sentence presented on the screen one word at a time (c.f. 2.3). Acceptability judgments scores obtained both in the survey and the processing experiment were similar. Therefore, I obtained the acceptability judgments data by incorporating it in the processing experiments and omitted the survey.

In order to obtain the processing time and the acceptability judgments, I constructed 35 target sentences. Each sentence is composed of the DC and a verb of various degrees of semantic compatibility with the DC determined by the criteria in 3.2.1. The verbs used in this experiment will be introduced in 5.1.1.1. Each sentence was constructed as [Subject$_{\text{ProperN}}$ Verb Recipient$_{\text{ProperN}}$ *the* Patient$_{\text{CommonN}}$] followed by a temporal adverbial clause or phrase as in (127).

(127) a. Johnny *gave* Jill the ball while he was in town.

b. Emma *wanted* Jen the class six days before their wedding.

5.1.1.1. Verb Selection

I selected 35 verbs, each of which occurs in a sentence, in the following way.

The 35 verbs were selected from the verbs that have been discussed in the semantic compatibility analysis in Chapter 3 (summarized in Table 10 in Chapter 3) or the verbs that occur in the BNC corpus with which I analyzed in Chapter 4.

The selected verbs are presented in Table 14.

Semantic Compatibility Category	Verb Subclass	Selected verbs
Verbs of inherent transfer	Inherently signifying giving Communication Instrument of communication Future having Sending Deictic	*give* *tell* *fax* *owe, promise, leave, allow* *send* *bring*
Verbs of possible transfer	Ballistic motion Creation Obtaining	*throw, drop* *create, cook* *find, buy, rent* (*hire* in BE)
Verbs of refused transfer	Refusal	*refuse, deny*
Verbs of impossible transfer	Damaging	*break, cut*
Verbs of events internal to	Emotion/cognition/desire	*think, want, wish*

the Agent	intransitive	*stay, sneeze*
Verbs occurring only in the corpus	Location General causation	*put, set* *cause*
Verbs that are expected not to occur in the DC	*present, donate, provide, push, whisper, say, choose*	

Table 14. Semantic Compatibility Category, Verb subclasses, and the verbs selected for the experiment

I first chose the verbs that were considered as occurring in the DC according to the compatibility analysis and at the same time, occurred in the corpus. I selected one verb from each verb subclass of "verbs of inherent transfer" category. Since the verbs in this category are the most compatible with the DC, they require no or very little coercion in order to occur in the DC. On the other hand, the verbs in all the other semantic compatibility categories will require more or less coercion because they are less compatible with the DC. In order to better examine how the coercion effect is reflected in processing time and naturalness judgments and confirm that the obtained data are not verb-specific but are common to the verbs in the same subclasses, I selected at least two verbs from the verb subcategories of the other compatibility categories as shown in Table 14.

In addition, I included some verbs that need more examination in the experiment as discussed in 4.3.3. First, the frequency pattern of some verbs was different from the other verb in the same subclass. For example, the "future having verbs" were expected to be frequently associated with the DC, but *owe* and *promise* are frequently associated with the DC whereas *leave* and *allow* in the same subclass are not. I tested all these four. Also, the "obtaining verbs" are expected not to be frequently associated with the DC but *buy* was exceptionally frequently associated with the DC compared with the others in the same subclass. Second, in the "obtaining verbs," as I stated in 4.3.3.3, I replaced British English *hire* with American English *rent*. Third, I also tested *create* in the "creation verbs," which is claimed not to occur in the DC probably due to its Latin origin (Pinker 1989). This verb does not occur in the corpus but its semantics belongs to 'creation verb.' I looked at the acceptability judgments and processing time of *create* in order to see whether or not people tend to depend on the semantics for processing and acceptability judgments.

The compatibility categories of "impossible transfer" and "events internal to the Agent" did not occur in the corpus probably due to their low semantic compatibility with the DC. For each verb subclasses in these compatibility categories, I included verbs that represent the semantics of the subclasses.

I also included several verbs that occur in the corpus but previous studies (Goldberg 1995 and Pinker 1989) have not considered as occurring in the DC. They are the "verbs of placement" such as *put*, "verbs of general causation" such as *cause*, and "verbs of hope" such as *want* and *wish*, which may belong to the compatibility category of "verbs of events internal to the Agent." Among the "verbs of hope," only *wish* occurs in the DC in the corpus.

Lastly, Goldberg (1995) and Pinker (1989) argue that some verbs do not occur in the DC. For example, "verbs of fulfilling" (*present*, *donate*, and *provide*), "verbs of continuous causation of accompanied motion in some manner" (*push*), "verbs of manner of speaking" (*whisper*), "verbs of proposition and propositional attitude" (*say*), and "verbs of choosing" (*choose*) were also tested.

5.1.1.2. Controlling linguistic items in the sentence

Bresnan (2007) points out that the Recipient of the DC is more likely to be a pronoun rather than a proper noun or a common noun. However, since the sentences in this experiment are given without any context, introducing a pronoun without any previous context may sound abrupt to the participants. For this reason, I controlled the Recipient as a proper noun throughout the target sentences.

According to Bresnan (2007), the Patient in the DC is more likely to be an indefinite, which suggests that an NP with an indefinite article may sound more natural to the participants. However, depending on the countability and pluralty of the noun, the indefinite article either is *a/an* or does not occur at all. For example, if nouns like *truth* and *shoes* are indefinite, they do not occur with an indefinite article, whereas *book* occurs with *a*. In short, there are two variants of the indefiniteness depending on the following noun. On the other hand, a definite article *the* can occur with any types of nouns above. For this reason, I controlled the article as a definite article.

I also controlled the number of syllables of the words in the sentence that may affect the processing time. The Recipient was controlled as a proper noun of one syllable and the Patient as a common noun of one syllable. In addition, the frequency of the nouns occurring as Patient was also controlled. All the words used for the experiment occurred 20~130 times in the subcorpus of the BNC that I used for the collexeme analysis in Chapter 4.

The stimuli sentences constructed in this way are presented in Appendix 4.

5.1.2. Participants

Twenty seven undergraduate students at Rice University participated in the experiment. They were all native speakers of English.

5.1.3. Method

The participants came to the linguistics lab by appointment. They read the instructions with examples unrelated with this study. They were told that they would read sentences and judge their naturalness. Since I was interested in the aspect of language use, the instruction was usage oriented such as 'how natural the sentence was for native speakers to say.' In order to minimize the influence of prescriptive grammar, I added that we were interested in their intuition, not what they learned in school.

Then, the participants read sentences presented on a computer screen.[40] Each sentence was presented one word at a time. In order to move to the next word, they hit the space key. Each sentence started with an asterisk signaling the start of the sentence. After reading each sentence, they judged the naturalness of the sentence with 1 as the most natural and 7 as the least natural. On the seven scales, 1 represents 'Perfectly natural. People say it naturally,' 4 represents 'I can't decide. It is natural in a way and unnatural in another way,' and 7 represents 'Not natural at all. No one says it.' When they hit the number key to enter the naturalness score, the next sentence started.

By using the software program Paradigm, I recorded the time to read each word, the naturalness score, and the time to judge the naturalness.

There were 35 target sentences and 70 filler sentences, so the participants read 105 sentences.

The presentation of these sentences was randomly ordered.

---

[40] The experiment was conducted in two different locations. 23 participants did the experiment in the sound booth and 4 did it in one of the quiet graduate students' offices. According to the *t*-test result, there was no difference in the data across locations ($t(25) = .43$).

5.1.4. Measuring processing time

Let us suppose that there is a sentence where a verb is incompatible with a certain construction. When people read a sentence, they will need to identify what the construction and the verb that they are reading are in order to comprehend the sentence. Then, they will notice that the co-occurrence of this verb and this construction is not natural. In this case, they will take more processing time to resolve this incompatibility than when there is no semantic incompatibility between the verb and the construction. In other words, I assume that the longer processing time is expected at the point where the verb and the construction are identified.

Unlike the cases of the SCC where I measured the RT for the following word of *that*, in case of the DC, we cannot compare the processing time of the collocations by looking at the processing time of only one point (i.e. one word) because depending on the verb, the point where the incompatibility is detected will be different. For example, as in (128) if the verb *kill* ever occurs in the DC and people read up to *John*, people will think that the person in the Recipient slot (*John*) is a Patient who is killed.

(128) <u>Mary killed *John*</u> **the bug** last night.

They will identify that the construction is the DC only after they read the second NP (*the bug*) and the processing time of this NP2 slot will get slower. Specifically, I predict that the processing time the definite article *the* of the Recipient will get slower because the word *the* already signals that they are reading an NP.

On the other hand, if the verb is *stay* as in (129), people will already recognize that something is weird when they read the first NP (the underlined *Sue*) because *stay* usually does not occur with an object. This may make the processing time of the NP1 slot slower.

(129) Ricky stayed ***<u>Sue</u>*** ***the*** *space* last evening.

Since the places where the delayed RT is predicted are different depending on the verb, I predicted that the slower processing time will be observed when the processing time of the NP1 (3^{rd} segment) and *the* (4^{th} segment) are added. For example, if participants are given a sentence like (129), the time to read the NP1 gets slower. However, the processing time *the* in the NP2 will not be affected and processed normally because they already detected the incompatibility at the 3^{rd} segment. On the other hand, if people are given a sentence like (128), the NP1 segment will be processed normally, but the *the* in the NP2 may get slower.[41]

Following Just, Carpenter and Woolley (1982, as cited in Gries, Hampe, and Schönefeld 2010), Hare, McRae, and Elman (2003), and Gries, Hampe, and Schönefeld (2010), I expect that the effects of the incompatibility will be apparent at

---

[41] It is possible to further look for a place where the processing time gets slow for each verb, and compare the processing time by types, one type for the verbs where NP1 gets slower and the other type for the verbs where the gets slower. However, the aim of the present study is to compare the processing time across the verbs regardless of these types. Thus, I aggregate the processing time for the two places. The processing time by types can be further examined in the future.

the one word after the target.[42] Consequently, what I actually analyzed was the added processing time of the following segments of the NP1 and *the* in the NP2, which correspond to *the* and the noun in the NP2, i.e. the processing time of the whole NP2 (e.g. *the* + *bug* in (128) and *the* + *space* in (129)).

The prediction is that the added processing time of the NP2 is related with the semantic compatibility analyzed based on the compatibility criteria, the rank of the collexeme analysis, and the naturalness judgment score.

5.1.5. Managing the data

In order to correlate the semantic compatibility, frequency, processing time, and acceptability judgments, each co-occurrence of a verb and the DC should be given the values of those variables. In this section, I will discuss how the values are given for each co-occurrence.

---

[42] In the processing time experiment of Hare, McRae, and Elman (2003), they designed a context so that a verb like *find* is expected to accompany a direct object (DO) (*They found the book.*). However, the actually presented target sentence accompanied a sentential complement (SC) (*They found the book was written poorly and*…). Hare, McRae, and Elman claim that after they read *was*, which prompts an SC, it becomes more evident that the participants read an SC as they proceed. Therefore, the participants should show a large effect of competition between SC and DO as this information accumulates (Hare, McRae, and Elman 2003: 290). Once the competition of the SC and DO is resolved, the processing time gets faster again. As a result, the delayed processing time is the most evident when they read a word, *written*, following the word that prompts the SC (*was*). Based on the result, and following other studies mentioned above, I predicted that the delayed processing time will be evident one word after the target.

5.1.5.1. Semantic compatibility scores and collostructional ranks

The values for the semantic compatibility were given based on the semantic compatibility category shown in Table 14. The verbs in the category of the verbs of inherent transfer were scored as 1, while the verbs in the category of the verbs of events internal to the Agent were scored as 5. In the experiment, there are some verbs which do not occur in the corpus, were not discussed in the compatibility category, or were not expected to occur in the DC. I gave them the compatibility scores based on their central meaning by using the criteria in 3.2.1. For example, *put, set, cause, push, whisper, say*, and *choose* were given score 2 like the verbs of possible transfer because the Patient is not damaged and may be able to be transferred. The verbs *present, donate*, and *provide* were given 1 because there are three salient participants in the event scene and the Patient is transferred. I will discuss the semantics of these verbs in more detail in 5.5.

For the scores of the collexeme analysis, I gave each verb the ranks resulted from the collexeme analysis in Chapter 4. There are some verbs that do not occur in the corpus data so these verbs couldn't get ranked through the collexeme analysis. These verbs were ranked equivalently as 50 since there were 49 verbs occurring in the corpus, except that *rent* was ranked as 35 because it replaces *hire* in British English.

Table 15 shows the semantic compatibility scores and collostructional ranks of each verb, which will be used for the statistical analysis.

Verb	**Compatibility Score**	**Collostructional Rank**	**Verb**	**Compatibility Score**	**Collostructional Rank**
give	1	1	*create*	2	50
tell	1	2	*deny*	3	28
send	1	4	*refuse*	3	30

owe	1	6	*break*	4	50
promise	1	13	*cut*	4	50
bring	1	16	*wish*	5	23
fax	1	25	*sneeze*	5	50
leave	1	36	*stay*	5	50
allow	1	47	*think*	5	50
buy	2	5	*want*	5	50
put	2	10	*provide*	1	34
find	2	32	*donate*	1	50
cook	2	33	*present*	1	50
rent	2	35	*push*	2	50
cause	2	38	*whisper*	2	50
set	2	39	*say*	2	50
throw	2	44	*choose*	2	50
drop	2	47			

Table 15. Semantic compatibility scores and collostructional ranks of the verbs selected for the experiment

Here is information to be notified about the variables of the collostructional rank and the semantic compatibility scores. I assume that the compatibility score and the collostructional rank of a verb are invariant across the participants because there is only one fixed value given based on the semantic analysis in Chapter 3 and the collexeme analysis in Chapter 4. For example, the compatibility score of *owe* is 2 and its collostructional rank is 6 for all 27 participants. In the case of the collostructional rank, if we had corpus data of each participant and could do collexeme analysis on this individual person's data, we would be able to give the verbs different collostructional ranks depending on the participants. However, since it is impossible to obtain an individual's corpus data, I will assume that the analysis resulted from the part of BNC in Chapter 4 is equivalently applicable to individual's frequency pattern.

5.1.5.2. Processing time and acceptability judgments

For the processing effort, I gave the added processing time of *the* and the noun in the NP2. For the naturalness judgments, I gave the naturalness scores obtained from the experiment. As a way of treating outlying observations, after I obtained the values by adding the processing time of the NP2, I replaced the values out of 3 times of the interquartile range with the grand mean.

I assume that each participant has his/her own standard of giving the acceptability judgment score. For example, when people read a co-occurrence with intermediate compatibility, some people are likely to score the sentences generously even if they sound somewhat unnatural while others are likely to score them rather conservatively and give low scores. Also, we can expect individual differences for the processing time as well. Some may tend to read sentences rather slowly while others tend to read sentence fast. Their natural reading speed may affect the processing time.

In order to minimize the individual differences stated above, I subtracted individual mean of the naturalness score and processing time from the original scores. For example of the naturalness scores of Participant 1, *give* was scored 1, *send* 1, *say* 7, *choose* 3 and so on. I averaged all the naturalness score given by Participant 1 (the mean was 3.03) and subtracted this mean from the original scores (i.e. *give* 1 - 3.03 = -2.03, *send* 1 - 3.03 = -2.03, *say* 7 - 3.03 = 3.97, *choose* 3 - 3.03 = -.03, etc). I used this subtracted values for the analysis. The same procedure was applied to the processing time data. I repeated the same procedure for all 27 participants' naturalness scores and processing time.

27 participants read 35 target sentences each of which contains 35 different verbs. It means that for each verb there are 27 naturalness scores and 27 processing times. Therefore, from the experiment, I obtained 945 observations (35 verbs x 27 participants) of the naturalness scores and 945 observations of the processing times.

All the observations for each verb are arranged in the following fashion in Table

16. For each verb, there are 27 observations of semantic compatibility score (SemCom), collostructional rank (ColloRank), naturalness score and added processing time of *the* and the noun in the NP2, where the difference of the original value is subtracted by the individual mean (NatScore and ProcessingT, respectively).

Verb	Participants	SemCom	ColloRank	NatScore	ProcessingT
give	1	1	1	-2.02857	-37.0673
	2	1	1	-2.02857	-99.0797
	3	1	1	-3.48571	342.5806
	4	1	1	-1.94286	-214.605
	5	1	1	-2.51429	-32.5377
	6	1	1	-2.85714	233.7417
	7	1	1	-2.31429	497.6621
	8	1	1	-3.02857	-174.516
	9	1	1	-0.34286	634.7873
	10	1	1	-3.25714	-156.814
	11	1	1	-3	-18.7616
	12	1	1	-2.8	-83.5877
	13	1	1	-2.37143	-8.62914
	14	1	1	-2.68571	39.41429
	15	1	1	-2.82857	-29.3423
	16	1	1	-2.37143	293.4161
	17	1	1	-1.94286	-93.0245
	18	1	1	-2.2	-265.08
	19	1	1	1.714286	48.62519
	20	1	1	-2.08571	-141.336
	21	1	1	-2.57143	-122.045
	22	1	1	0.771429	-195.539
	23	1	1	-2.97143	-228.087
	24	1	1	-3	-45.8034
	25	1	1	-1.91429	-80.3242
	26	1	1	-3.4	351.0471
	27	1	1	-2.42857	-131.552
send	1	1	4	-2.02857	-255.077
	2	1	4	-2.02857	-97.0597
	3	1	4	-3.48571	-32.0494
	4	1	4	-2.94286	-81.5052

	5	1	4	-2.51429	-123.908
	6	1	4	-2.85714	110.0517
	7	1	4	-2.31429	-449.108
	…	…	…	…	…
	…	…	…	…	…
	…	…	…	…	…

Table 16. Example of the data arrangement

5.2. Analysis and prediction

I first tested correlation to see if each variable is related with one another in Table 17.

	SemCom	ColloRank	NatScore	ProcessingT
SemCom				
ColloRank	.42**			
NatScore	.54**	.41**		
ProcessingT	.09*	.12 **	.13**	

Table 17. Correlations among the variables (* $p < .01$, ** $p < .001$)

As we can see in Table 17, all the variables inserted in the regression model are significantly correlated with each other. This table shows that the semantic compatibility scores are related with the collostructional rank, the naturalness scores, and the processing time, the collostructional rank is related with the other three variables, the naturalness scores are related with the other three variables, and the processing times are related with the other three variables.

However, this correlation table does not tell us if they are related positively or negatively, or which variables contribute significantly to explain the processing time or the naturalness score when the other variables are considered together.

Therefore, I analyzed their relationship by using linear regression in order to understand the correlation more.

A caveat of running regression on the four variables, i.e. semantic compatibility, frequency, processing time, and naturalness judgment, is that it is hard to know which variables are causes and which is an effect.[43] For example, we can say that people judge the co-occurrence of a particular verb and the DC acceptable because they are semantically compatible, frequently used, and processed easily. We can also say that their co-occurrence is processed fast because they are compatible, frequently used together and people feel the co-occurrence acceptable. Even though I run regression on a certain variable by putting the other variables as predictors, I do not claim that the predictor variables are causes and the predicted variable is an effect. Instead, I emphasize that the aim of linear regression in this study is to show the correlation among the variables.

First, in 5.3.1, I will show the results from the regression on the naturalness scores. In other words, in the linear regression model on the naturalness score, all the other three variables (i.e. semantic compatibility, collostructional rank, and processing time) are inserted as the predictors. This is to see if the naturalness of the sentences is correlated with the semantic compatibility, frequency, and processing effort and which factors contribute to the relation. If a verb is semantically more compatible with the DC, more frequently associated with the DC, and processed faster when occurring in the DC, I expect that the collocation of the verb and the DC will be judged more natural. It means that smaller value in naturalness score (NatScore) is explained with smaller values in compatibility score (SemCom), collostructional rank (ColloRank), and processing time (ProcessingT).

---

[43] In principle, a regressor of a regression model is an effect while predictors are causes.

Next, in 5.3.2, I will run regression on the processing time with the semantic compatibility, and frequency as the predictors to see if the processing effort is significantly related with these two predictors and which variables significantly contribute to the relationship. I did not include naturalness score as a predictor in this model for the following reason. As I stated above, the processing time is considered as a predictor of the naturalness score. If I include the naturalness score as a predictor for the regression on the processing time, the processing time is included as if it is a predictor. In short, the processing time is regarded as not only the predicted variable but also the predictor. In order to avoid this circularity, I will not insert the naturalness score in this model. The reasoning behind this regression model is that if a verb is semantically more compatible with the DC and frequently used with the DC, people will process the collocation of the verb and the DC faster.

5.3. Result and Discussion

5.3.1. Regression on the naturalness score

As a result from the analysis of regression on the naturalness score, the semantic compatibility, collostructional rank, and the processing time were significantly related with the naturalness score ($r^2 = .33$, $p < .001$). The model resulted from the regression is presented in (130) with the p value of each slope presented below.[44]

(130) $y_{\mathrm{NatScore}} = .79x_{\mathrm{SemCom}} + .03x_{\mathrm{ColloRank}} + .001x_{\mathrm{ProcessingT}} - 2.87$

($p < .001$) ($p < .001$) ($p < .05$)

[44] The statistical power of this model was 1.00.

As the coefficient of the predictors and their *p* values in (130) show, all three variables (SemCom, ColloRank, and ProcessingT) significantly have a positive influence on the model. In other words, if the value of the SemCom gets larger, the NatScore also gets larger even when the other predictors are fixed. When ColloRank gets larger, the NatScore also gets larger even when the other predictors are fixed. And when ProcessingT gets larger, the value of NatScore gets larger. This means that as the verb in the sentence gets semantically less compatible with the DC, gets less strongly associated with the DC, gets processed slower, the sentence gets judged less natural.

This result is in accord with the prediction in 5.2. When people judge the naturalness (NatScore) of a sentence where a certain verb and the DC are used together, it seems that the linguistic knowledge about the semantic compatibility between the verb and the construction (SemCom), how frequently the co-occurrence of the verb and the DC is heard or spoken (ColloRank), and the time to process the collocation (ProcessT) contribute to the judgments.

5.3.2. Regression on the processing time

As a result of the linear regression, the time to process a verb in the DC was significantly related with the semantic compatibility and frequency (r^2 = .02, $p < .001$).[45] The model resulted from the regression is presented in (131) with the *p*

---

[45] The r^2 is only .02, meaning that the model in (131) explains only 2% of the processing time whereas the model for the NatScore in (130) explains 33% of the naturalness score. The r^2 of (131) may be this low because there were 945 observations of processing time from which we

value of each slope presented below.[46]

$$(131)\ y_{\text{ProcessingT}} = .7.79x_{\text{SemCom}} + 1.47x_{\text{ColloRank}} - 67.72$$
$$(p = .22) \qquad (p < .01)$$

In (131), the collostructional rank was positively related with the processing time. It means that when a verb is more frequently associated with the DC, the processing time gets faster.

However, the semantic compatibility does not contribute to predicting the processing time if the information about collostructional rank is given. We can say that the portion that the semantic compatibility can explain the processing time is already explained by the collostructional rank. In other words, the semantic compatibility does not contribute to the explanation of the processing time independently. However, this does not mean that the semantic compatibility is not correlated with the processing time, because we have seen the correlation between the processing time and the semantic compatibility in Table 17.

---

can expect great deviations while there were only two factors explaining these observations. The possible range of the processing time is much larger than that of the naturalness score as the standard deviations of these variables show. The standard deviation of the ProcessingT was 241.72, while that of the NatScore was only 2.45. This suggests that it may be hard to explain all the errors or deviations in the 945 observations with two variables. However, the statistical analysis confirms that the semantic compatibility and frequency are significantly related with the processing time ($p < .001$), even though the r^2 was somewhat low.

[46] The statistical power of this model was .98.

In order to make sure that the semantic compatibility is also related with the processing time, I used multiple regression with the ProcessingT as the dependent variable. At the first step, I inserted SemCom to see if it significantly contributes to predicting the ProcessingT, without considering the ColloRank. At the second step, I inserted ColloRank to see if how the contribution of the SemCom changes when ColloRank is considered. The result is presented in Table 18.

		Unstandardized coefficient	Standardized coefficient	p	
Step 1	Constant SemCom	-34.70 15.37	 .09	 $p < .01$	$r^2 = .01$ ($p < .01$)
Step 2	Constant SemCom ColloRank	-67.72 7.79 1.47	 .04 .10	 $p = .218$ $p < .01$	$r^2 = .02$ ($p < .001$)

Table 18. Result of the multiple regression

As the r^2 of the Step 1 in Table 18 shows, when only the SemCom is inserted for the regression, this variable significantly explains the processing time. As the unstandardized coefficient shows, the SemCom is positively related and the contribution of the SemCom to this model is significant ($p < .01$).

However, when we add another variable, which is ColloRank as a predictor, the importance of the SemCom decreases as the standardized coefficient shows. Also, p values of the coefficients of these variables also indicate that knowing SemCom is not significant in predicting the processing time if we know the ColloRank. This relation can be pictorially described as in Figure 11.

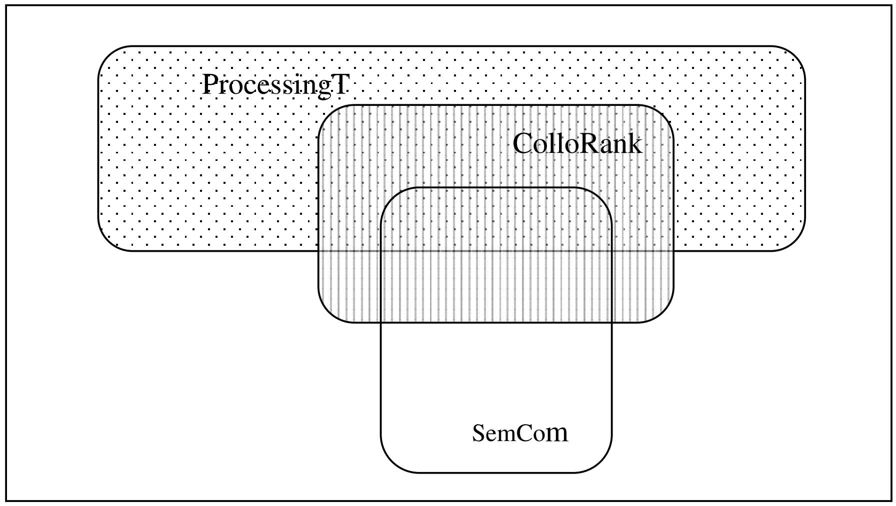

Figure 11. Relation among the variables

Figure 11 is a schematic relation among the variables. It shows that some ProcessingTs are explained by the SemCom and some ProcessingTs are explained by the ColloRank. However, when ColloRank and SemCom are considered together, there is no ProcessingT that the SemCom explains independent of the ColloRank because the ProcessingTs that the SemCom explains can be explained by the ColloRank.

Therefore, I conclude that the semantic compatibility between a verb and the DC influences the processing of their co-occurrence but not independently of the frequency.

5.3.3. Summary and implication

As I predicted in 5.2, the correlation shown in Table 17 revealed that the linguistic knowledge about semantic compatibility between lexical items and the construction and the aspects of language use (i.e. how frequently they are associate with, and how easily they are processed and how natural they are judged when occurring together) are all correlated. The regression on the naturalness judgments showed that if a co-occurrence of a lexical item and a construction is semantically highly compatible, it is frequently used, processed fast, and judged natural.

In addition, the subsequent multiple regression on processing time shown in Table 18 suggests that the semantic compatibility is correlated with the processing time: the co-occurrence of a lexical item and a construction that are not semantically compatible are processed slowly.

However, the regression on the processing time in (131) showed that the semantic compatibility is correlated with the processing time but it does not independently contribute to the processing time when frequency information is given.

This result suggests re-considering the independence of the semantic compatibility from the language use, i.e. frequency and processing. The semantic compatibility score was constructed theoretically driven through the semantic analysis. In order to make the semantic compatibility as independent of the dimensions of the language use as possible, I relied on the literatures such as the categorizations of Pinker (1989) and Goldberg (1995) and dictionaries. Nevertheless, the regression result implies that this semantic analysis from the linguistic point of view by linguists and lexicographers may be still strongly affected by their language use; how often they hear the collocation of a verb and the DC. This supports the usage-based view that linguistic knowledge and language use are not independent, but they closely interact.

5.4. Semantic compatibility and the results from the experiment

By using correlation and linear regression, I showed that the four dimensions, i.e. semantic compatibility, frequency, acceptability judgments, and processing time are all correlated. In this section, I will particularly examine the relation of the semantic compatibility with the naturalness judgments and processing in more detail.

I present the average scores of each verb for each variable in Table 19, ordered from the smallest score to the largest score.[47] In this way, we can see which verb is the most compatible with the DC, which verb was the most frequently used with the DC, which verb was judged the most natural, and which verb was processed fasted.

order	SemCom		ColloRank		NatScore		ProcessingT	
1	*give*	1	*give*	1	*fax*	1	*drop*	747.72
2	*send*	1	*tell*	2	*send*	1	*tell*	751.22
3	*bring*	1	*send*	4	*promise*	1.22	*send*	752.48
4	*tell*	1	*buy*	5	*tell*	1.22	*promise*	752.74
5	*fax*	1	*owe*	6	*bring*	1.33	*owe*	754.20
6	*owe*	1	*put*	10	*buy*	1.48	*leave*	754.68
7	*promise*	1	*promise*	13	*give*	1.56	*deny*	768.28
8	*leave*	1	*bring*	16	*throw*	1.67	*wish*	771.49
9	*allow*	1	*wish*	23	*leave*	1.81	*find*	776.11
10	*present*	1	*fax*	25	*rent*	1.93	*provide*	778.03
11	*donate*	1	*deny*	29	*present*	2.15	*rent*	778.49
12	*provide*	1	*refuse*	31	*deny*	2.19	*buy*	789.85
13	*cook*	2	*find*	33	*cook*	2.63	*create*	793.16
14	*create*	2	*cook*	34	*provide*	2.78	*cut*	795.85
15	*buy*	2	*provide*	35	*find*	2.85	*throw*	799.22
16	*find*	2	*rent*	36	*push*	3.07	*choose*	807.73
17	*rent*	2	*leave*	37	*whisper*	3.26	*donate*	810.45
18	*throw*	2	*cause*	39	*refuse*	3.48	*put*	817.74
19	*drop*	2	*set*	40	*allow*	3.81	*refuse*	835.52
20	*put*	2	*throw*	45	*donate*	3.81	*push*	844.45

[47] Note that the 'order' in the leftmost column is not applicable to the column SemCom if the verbs have the same SemCom scores. For example, the verbs from *give* to *provide* have the same SemCom score as 1, and their order within the same semantic compatibility category is not relevant here.

21	*set*	2	*allow*	48	*cut*	3.89	*give*	845.16
22	*cause*	2	*drop*	48	*owe*	4.60	*cause*	845.27
23	*push*	2	*break*	51	*set*	5.00	*cook*	846.09
24	*whisper*	2	*choose*	51	*drop*	5.07	*stay*	849.44
25	*say*	2	*create*	51	*break*	5.41	*fax*	852.80
26	*choose*	2	*cut*	51	*create*	5.60	*present*	898.78
27	*refuse*	3	*donate*	51	*say*	6.07	*allow*	905.96
28	*deny*	3	*present*	51	*wish*	6.15	*think*	908.07
29	*break*	4	*push*	51	*choose*	6.19	*say*	908.89
30	*cut*	4	*say*	51	*cause*	6.26	*whisper*	909.64
31	*stay*	5	*sneeze*	51	*want*	6.48	*sneeze*	926.00
32	*sneeze*	5	*stay*	51	*think*	6.63	*want*	948.65
33	*wish*	5	*think*	51	*stay*	6.74	*break*	958.33
34	*want*	5	*want*	51	*sneeze*	6.81	*bring*	960.24
35	*think*	5	*whisper*	51	*put*	6.93	*set*	970.43

Table 19. The average score of the verbs in each variable (ordered from the smallest value to the largest value)

If the naturalness judgment score and the processing time are correlated with the semantic compatibility, when the verbs are ordered based on the semantic compatibility score, the naturalness score and the processing time are expected to show a linear trend across the verbs. For example, the semantic compatibility score of *send* is 1, *find* is 2, *refuse* is 3, *cut* is 4, and *stay* is 5, and in Table 19, we can see that the NatScore increases (i.e. judged less natural) for *send* (1), *find* (2.85), *refuse* (3.48), *cut* (3.89), and *stay* (6.74), and that ProcessingT increases (i.e. processed slower) in general (752.48, 776.11 835.52, 795.85, 849.44, respectively).

I will examine this linear pattern in more detail. In this section, I used the original data of the processing time and naturalness score obtained from the experiments without subtracting the mean scores in order to represent the actual pattern. However, the outliers are replaced with the grand mean for further linear trend analysis in 5.4.1 and 5.4.2.

5.4.1. General tendency of the naturalness score

First, I plotted the verbs in the order of NatScore as in Figure 12 to see if there is a tendency that semantically more compatible verbs are judged more natural and semantically less compatible verbs are judged less natural.

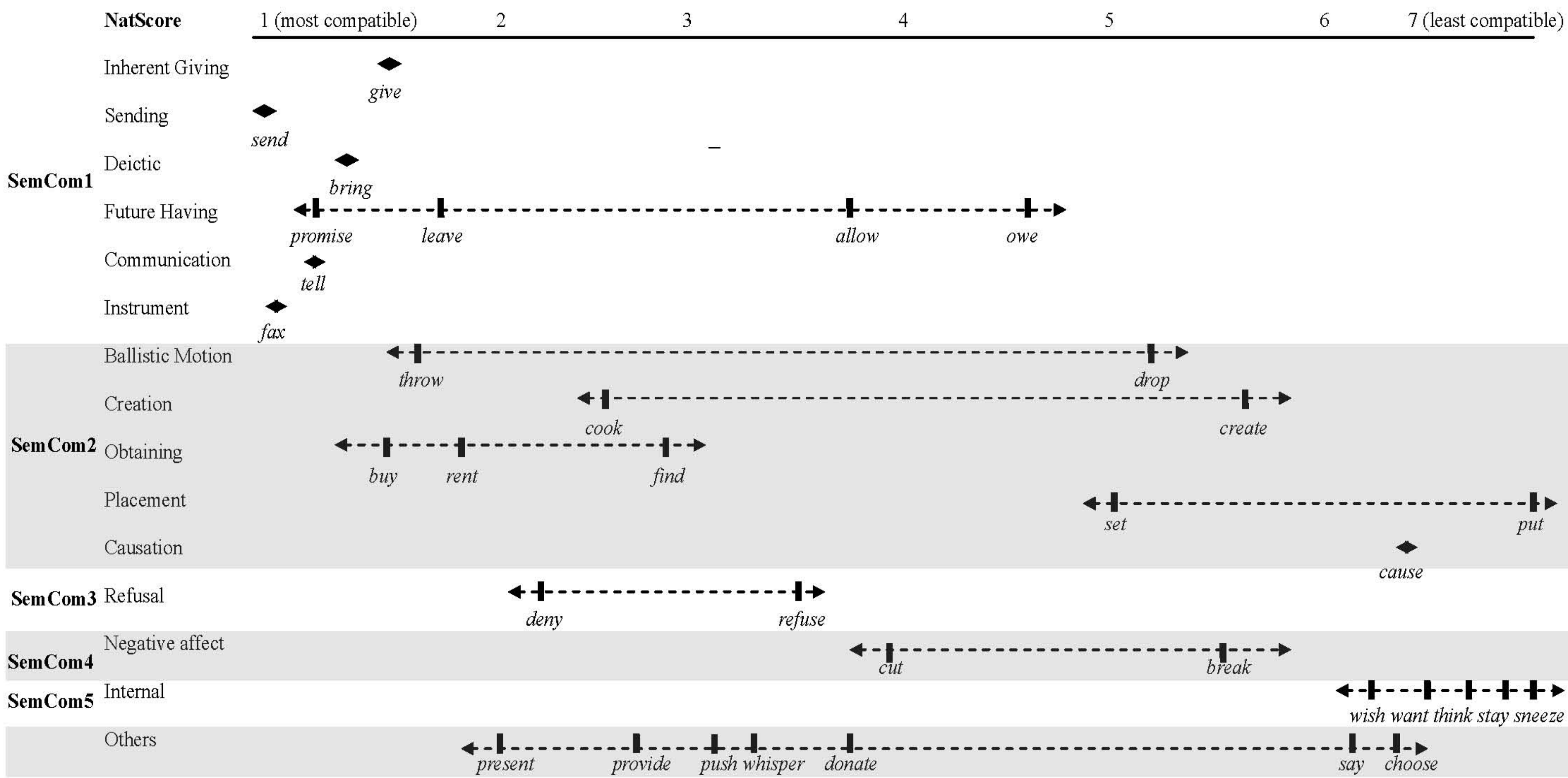

Figure 12. Individual verbs plotted in order based on the NatScore

The verbs are grouped based on their semantics, and then the semantic compatibility category. Ideally, the verbs in SemCom1 are expected to be judged the most natural so they are expected to be plotted close to the NatScore 1. The verbs in the SemCom2 are expected to be grouped as the second most natural. The verbs in the SemCom3 are expected to be grouped as the third most natural, and the verbs in SemCom5 are plotted close to NatScore of 7.

Note that the verbs labeled as "others" at the bottom in Figure 12 are the verbs that are claimed not to occur in the DC by Goldberg (1995) and Pinker (1989). Since these verbs do not occur in the DC, they are expected to be incompatible with the DC, and thus, expected to be judged as unnatural and processed as slowly as the ones in the SemCom 5. These verbs will be discussed separately in 5.5.6.

As shown in Figure 12, most SemCom1 verbs (e.g. *give, send, bring, promise, leave, tell*, and *fax*) fall between NatScore of 1 and 2. The verbs of SemCom 2 such as *throw, cook, buy, rent*, and *find* also show the tendency that they are plotted in the second most natural group even although *drop* and *create* are plotted rather behind. However, verbs of placement and verbs of general causation were not judged as natural as the other SemCom2 verbs. I will discuss these verbs in 5.5.2. The verbs of prevented transfer (i.e. refusal verbs) that belong to SemCom3 are plotted close to the second most natural group, but we can see the tendency that they are plotted in the middle of the SemCom2 verbs such as *throw, cook, buy, rent*, and *find* and the SemCom4 verbs such as *cut* and *break*. *Cut* and *break* (SemCom4) are roughly plotted in the 4th most natural group, and the rest of the verbs (i.e. the verbs of events internal to the Agent such as *wish, want, think, stay*, and *sneeze*) are plotted close to NatScore of 7.

From the pattern that the verbs are plotted in Figure 12, we can see the tendency that the verbs in SemCom1 are relatively judged natural while the verbs in SemCom 5 are judged not very natural.

To show this tendency more briefly, I averaged the NatScore of each semantic compatibility category as in Table 20. In Table 20, the verbs such as *present, donate*, and *provide* are labeled "verbs of fulfilling" and the verbs such as *push, whisper, say*, and *choose* are labeled "all others." The average NatScores are presented as a line graph in Figure 13. The solid line connects the average NatScore of each SemCom and the dotted line represents its linear fit to guide how the obtained data fit the ideal linear trend. The equation and R^2 are presented at the corner.

Semantic Compatibility Category	NatScore_Mean
SemCom 1 (verbs of inherent transfer)	1.76
SemCom 2(verbs of possible transfer)	3.58
SemCom 3 (verbs of prevented transfer)	2.83
SemCom 4 (verbs of impossible transfer)	4.65
SemCom 5 (verbs of events internal to the Agent)	6.56
Verbs of fulfilling (*present*, etc)	2.91
all others	4.65

Table 20. Average NatScore of each semantic compatibility category

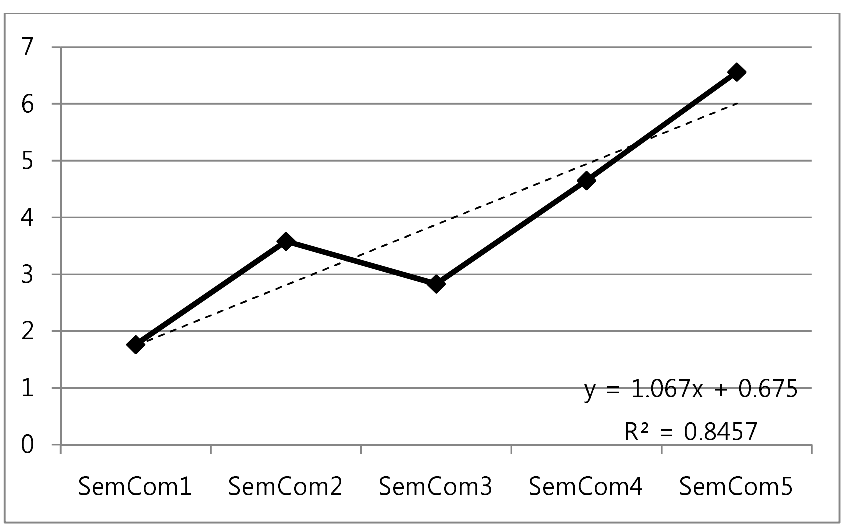

Figure 13. Average Naturalness scores of each semantic compatibility category

In Figure 13, we can see a linear trend that the more compatible verbs are judged more natural. In order to confirm the linear pattern of the naturalness scores across the semantic compatibility categories, I conducted trend analysis of linear contrast for the NatScore.[48]

The result from the linear contrast revealed that this linear trend is statistically significant ($t(26) = 30.29$, $p < .001$). It means that the verbs in SemCom1 (verbs of inherent transfer) are most natural and the ones in SemCom5 (verbs of events internal to the Agent) are the least natural.

The exception is that the verbs in SemCom3 (verbs of prevented transfer) are judged less natural than the ones in SemCom2 (verbs of possible transfer). The possible reasons for the higher NatScore of SemCom2 than that of SemCom3 will be discussed in 5.5 when examining the semantics and coercion of individual verbs.

As we can see from Table 20, the verbs of fulfilling were judged more natural (2.91) than the verbs of SemCom2 (3.58) and slightly less natural than the verbs of SemCom3 (2.83). Also, the verbs *push, whisper, say*, and *choose* were judged as natural as the verbs of SemCom4 (4.65) and more natural (4.65) than the verbs of SemCom5 (6.56). This means that even though these verbs are known as the verbs not

---

[48] Since the number of verbs in each category was different across the SemComs, trend analysis through one-way ANOVA cannot be conducted. Therefore, for the linear contrast of this data set, I formed new values of the ProcessingT and NatScore for the linear contrast and ran a *t*-test for this value comparing 0. The vectors for the new values are presented in Appendix 5.

occurring in the DC, people try to coerce it and make sense out of the somewhat incompatible co-occurrenc. I will discuss the semantics of these verbs and their coercion in more detail in 5.5.6.

5.4.2. General tendency of the processing time

According to the average scores of each verb in Table 19, I plotted the verbs in the order of the ProcessingT as in Figure 14 to see if there is a tendency that semantically more compatible verbs are processed faster and semantically less compatible verbs are processed slower.

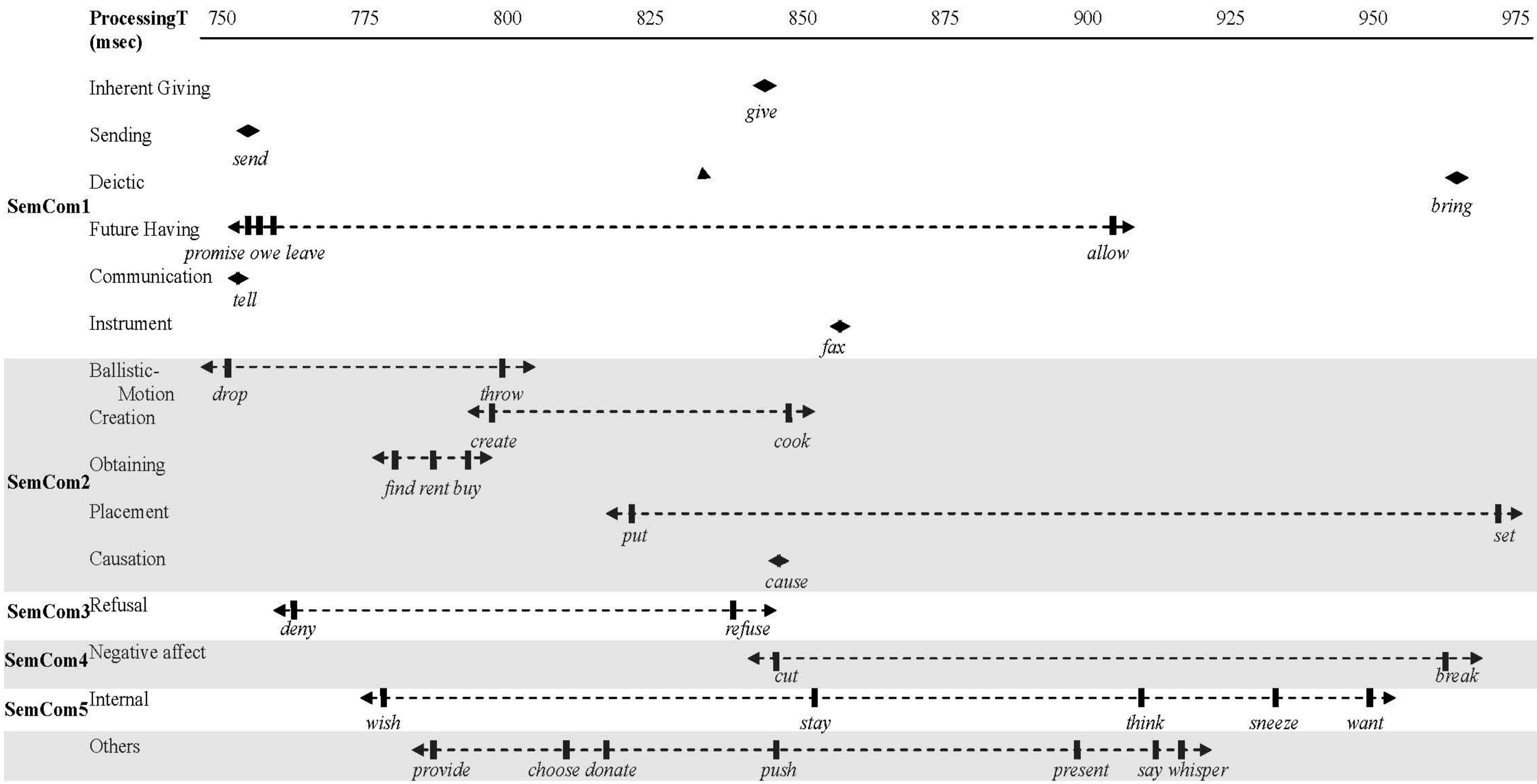

Figure 14. Individual verbs plotted in order based on the ProcessingT

The verbs in SemCom1 are relatively processed faster than the verbs in other SemCom categories. Specifically, *send, promise, owe, leave*, and *tel*l are processed fastest except for *drop*. However, four verbs out of nine in SemCom1 were processed unexpectedly slowly, which are *give*, *fax, allow,* and *bring*, which will be discussed later in this section. The verbs in SemCom2 such as the verbs of ballistic motion, creation, and obtaining, are roughly plotted in the second fasted group except that *drop* was processed fastest of all verbs and set was processed slowest of all verbs. *Cause* were processed slower than had been expected. The exceptions will be discussed in more detail in 5.5.2. Among the verbs of SemCom3 *refuse* was plotted behind most verbs of SemCom2 while *deny* was processed slightly faster than most SemCom2 verbs. When averaged, the processing time for the verbs of SemCom4 (877.09 msec) was slower than the verbs in SemCom2 (816.41 msec) and SemCom3 (801.90 msec) but faster than the verbs of SemCom5 (880.73 msec) (c.f. Table 21 below). The verbs in SemCom5 were the slowest in general except *wish*. When plotted in the order of ProcessingT, we can see a general tendency that semantically more compatible verbs are processed faster than the verbs semantically less compatible verbs.

I present in Table 21 the average processing time for the verbs in each semantic category. Again, the verbs that are expected not to occur in the DC, such as *present, provide*, and *donate*, and *push, whisper, say,* and *choose*, were analyzed separately. The linear is presented in Figure 15 with its trend line.

Semantic Compatibility Category	ProcessingT_Mean
SemCom 1 (verbs of inherent transfer)	814.39
SemCom 2(verbs of possible transfer)	816.41
SemCom 3 (verbs of prevented transfer)	801.90

SemCom 4 (verbs of impossible transfer)	877.09
SemCom 5 (verbs of events internal to the Agent)	880.73
Verbs of fulfilling (*present*, etc)	829.09
all others	867.67

Table 21. Average processing time of each semantic compatibility category

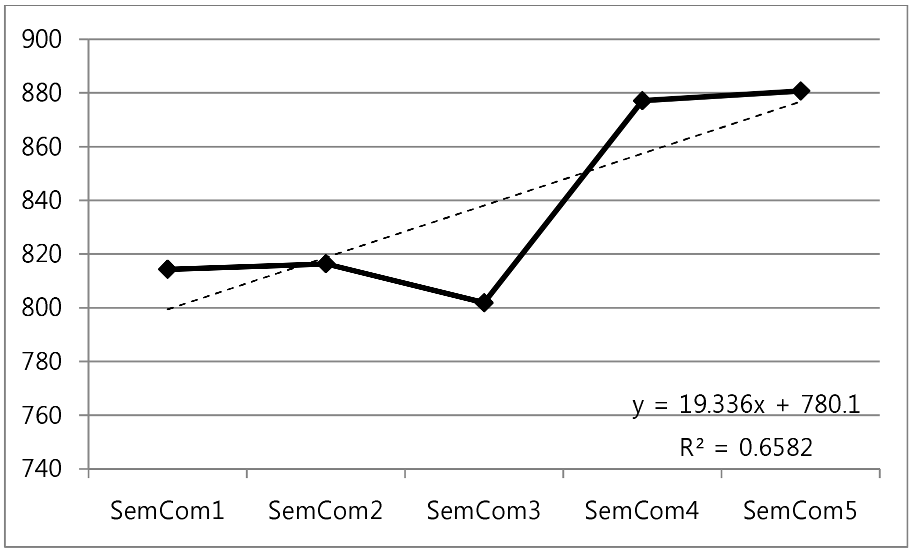

Figure 15. Average processing time (msec) of each semantic compatibility category

In order to confirm the linear trend that semantic compatibility of a verb with the DC is generally correlated with the processing time of the co-occurrence of the verb and the construction, I conducted linear contrast. As a result, I could find a linear trend of the processing time throughout the semantic compatibility categories ($t(26) = 3.02$, $p < .01$), meaning that verbs that are semantically more compatible verbs are processed faster than the less compatible verbs.

Nevertheless, according to Table 21 and Figure 15, the verbs in SemCom3 were processed faster than the ones in SemCom1 and SemCom2. It is possibly because there are many more observations in SemCom1 and SemCom2 than in SemCom3 so the verbs in SemCom1 and SemCom2 are more likely to get more outlying observations. There were nine verbs (i.e. 243 observations) in SemCom1 and ten verbs (i.e. 270 observations) in SemCom2 whereas there were only two verbs (i.e. 54 observations) in SemCom3. As stated earlier, four verbs out of nine in SemCom1 were processed unexpectedly slowly, which are *give*, *fax, allow,* and *bring*. All these four verbs have larger standard deviation (SD) than the other five verbs. For example, the SDs of the other five verbs (*send, promise, owe, leave*, and *tell*) were less than 200. However, the standard deviation of *bring* was 503.34. It means that *bring* has one or more observations that are exceptionally processed slowly. Even though I had already replaced the outliers with the grand mean, there were still several exceptionally delayed processing times in these four verbs. These exceptional observations may have caused slow processing times when the processing times of the verbs are averaged. The verbs *give, fax*, and *bring* were within tenth order in the ColloRank and NatScore, meaning that they are still frequently associated with the DC and judged natural when occurring with the DC.[49] I suspect that the delayed processing time of these verbs could be due to unexpected slow processing randomly caused by non-linguistic factors, for example, the participants did not focus on the task.

Let us discuss the verbs of placement (i.e. *put* and *set*) and the verbs of general causation (i.e. *cause*). I categorized these verbs in SemCom2. However, they were processed relatively slower and these verbs pushed the average ProcessingT of SemcCom2 slower in general. This result is in accord with the result from the collexeme analysis and the naturalness judgments. They were not frequently

[49] The verb *allow* is an exception because its collostrucitonal rank is low, and it was judged not very natural with the DC. I will discuss this verb in later section.

associated with the DC and not judged very natural, and therefore, not processed very fast. From the results of the corpus analysis and the experiment on the acceptability judgments and processing time, I conclude that verbs of placement and verbs of general causation are not as semantically compatible as the other verbs in SemCom2 due to their detailed semantic properties discussed in 4.3.3.2, which I will additionally discuss in more detail in 5.5.2.

When *put, set*, and *cause* are excluded, the verbs in SemCom2 were judged more natural and processed faster than the verbs in SemCom3 as in Table 22.

	NatScore		ProcessingT	
put, set, cause	Included	Excluded	Included	Excluded
SemCom2	3.58	2.65	816.41	790.09
SemCom3	2.83	2.83	801.90	801.90

Table 22. the NatScore and ProcessingT when *put, set*, and *cause* are excluded

When *put, set*, and *cause* are excluded, the average naturalness score of each semantic compatibility category shows evident linear trend as shown in Figure 16.

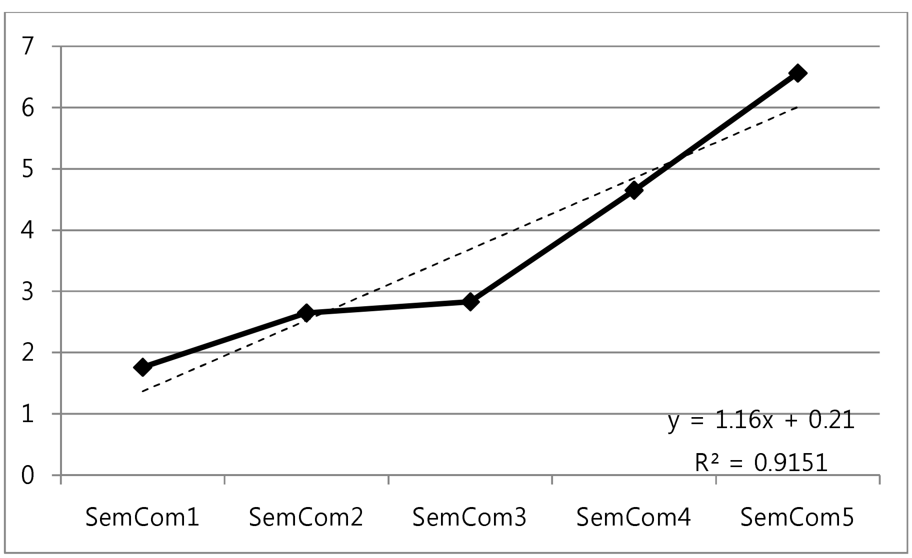

Figure 16. Average naturalness score of each semantic compatibility category (excluding *put, set*, and *cause*)

If we compare the fit of the observed average scores to the trend line in Figure 13 with that in Figure 16, the fit improved from $R^2 = 0.85$ to $R^2 = 0.91$.

Also, we can clearly see in Figure 17 that the verbs in SemCom3 were processed slower than the verbs in SemCom2 even though the average processing time of SemCom1 is slower than the ones of SemCom2 and SemCom3. Again, the slow average processing time in SemCom1 is probably because of the verbs that have observations exceptionally processed slow. Because of the slow processing time in SemCom1, when we compare the fit of the observed average ProcessingT to its trend line in Figure 15and that in Figure 17, the fit did not get any better even if we exclude *put, set*, and *cause*.

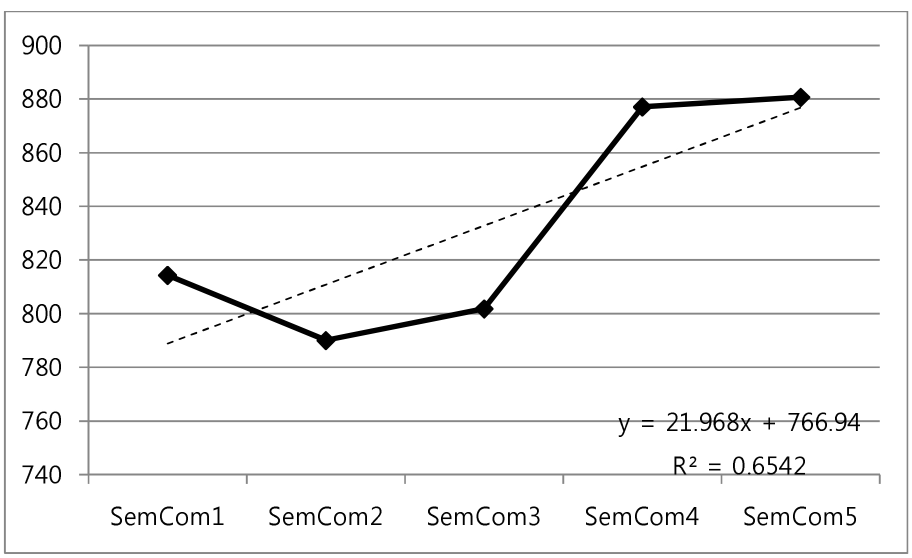

Figure 17. Average processing time of each semantic compatibility category (excluding *put, set*, and *cause*)

However, when we just compare the linear trend across SemCom2 to SemCom5, the fit, when *put, set*, and *cause* are excluded, became better as we can see in Figure 18 and Figure 19. The fit is better when *put, set*, and *cause* are excluded (from $R^2 = 0.72$ to $R^2 = 0.87$).

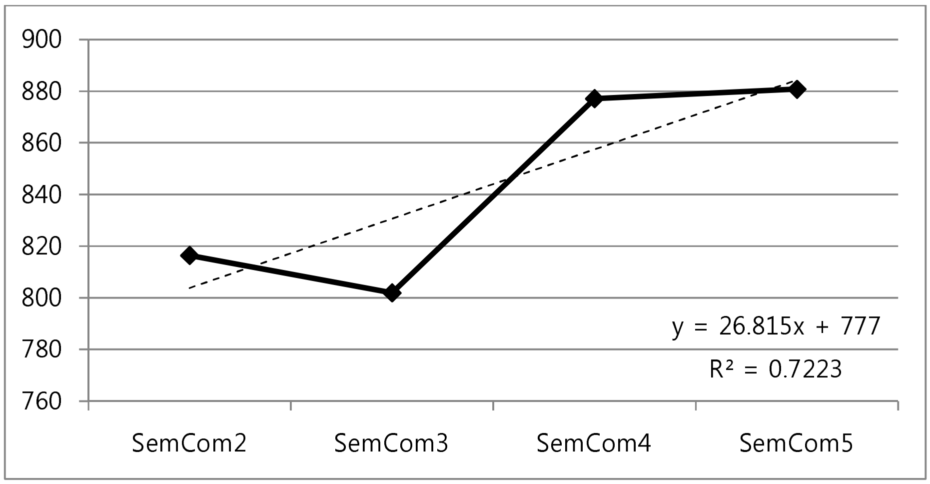

Figure 18. Average processing time of SemCom2 to SemCom5 (including *put, set*, and *cause*)

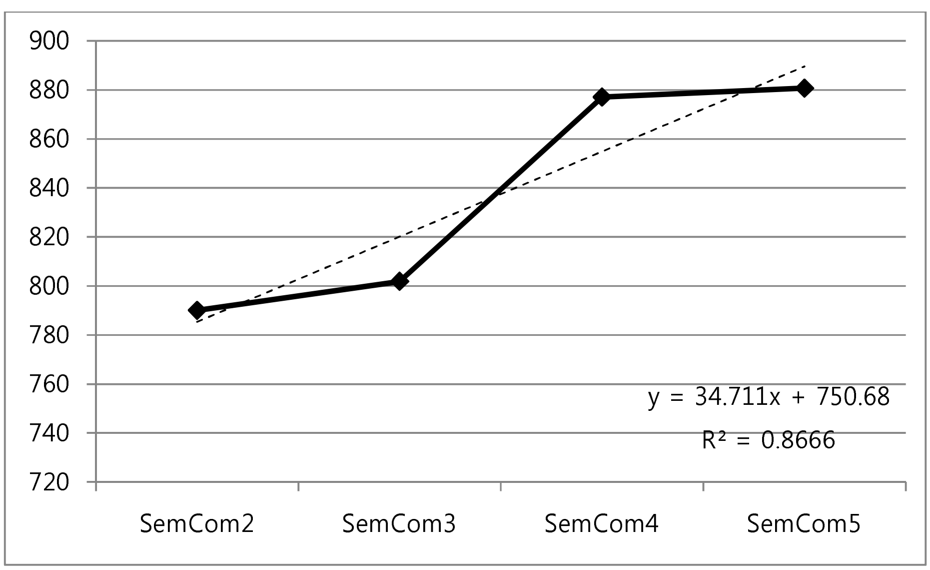

Figure 19. Average processing time of SemCom2 to SemCom5 (excluding *put,*

set, and *cause*)

If we consider the possibility of exceptionally slow processing time of some verbs in SemCom1 and less compatible semantics with the DC of *put, set*, and *cause* in SemCom2 than expectation, we can conclude that processing time is also correlated with the semantic compatibility, as was supported by the result of the regression shown in 5.3.

5.4.3. Summary and implication

The linear trend of the NatScore shown in Figure 13, Figure 16, and Table 20 and the linear trend of the ProcessingT shown in Figure 15, Figure 19, and Table 21 provide evidence for the claim that the verbs more semantically compatible with the DC are judged more natural and processed faster and the verbs less compatible with the DC are judged less natural and processed slower when occurring in the DC. Also, when the verbs are ordered and plotted based on its NatScores and ProcessingTs in Table 19 in Figure 12 and Figure 14, we can see a general trend that the verbs that are semantically more compatible with the DC are judged more natural and processed faster.

What does the gradient trend of processing time and acceptability judgments and their correlation with the semantic compatibility imply for coercion? I claim that the empirical data of experiments challenges the binary perspective on coercion. If we see coercion as "resolution of semantic incompatibility between a lexical item and a construction" as the previous studies on coercion (Croft 1991, Michaelis 2005, Panther and Thornburg 1999, 2000, Ziegeler 2007a, 2007b) has defined, we deal with coercion from the binary perspectives: semantically compatible or incompatible, and the incompatibility is resolved or not resolved, and coercion occurs or does not occur. On this view, the concept "coercion" is employed only for the case where there is incompatibility and the incompatibility is resolved. However, on this binary view, we cannot explain why there are different degrees of processing effort and why the acceptability of their co-occurrence can be different depending on the semantic compatibility and processing effort.

Therefore, I propose that we view coercion as a psychological process to resolve the different degrees of semantic incompatibility between a lexical item and a construction. The gradient nature of processing time shows that not all incompatibility can be resolved with the same amount of effort. The correlation of the processing time with the semantic compatibility shows that the less a lexical item and a construction are semantically compatible, the more effort it takes to resolve the incompatibility because people have to employ various linguistic or non-linguistic contexts so they can use the incompatible linguistic elements together.

The correlation of processing time and semantic compatibility with the acceptability judgments shown in (130) implies that people may judge the co-occurrence of the incompatible elements not very natural if incompatibility can be resolved with a lot of effort. Actually, there is another case where the co-occurrence of incompatible elements is judged unnatural: people fail to resolve the incompatibility and make sense out of the co-occurrence even if they attempt to. In this case, people judge the co-occurrence very unnatural and processing time is very long. If coercion is a psychological process of resolving incompatibility, we do not exclude the cases where the incompatibility may not be resolved because we still acknowledge the processing effort for coercion. Moreover, this view is open to the possibility that the incompatibility may be able to be resolved if people try even harder to resolve the incompatibility and more processing effort is taken.

Note that some of the verbs were judged less natural or processed slower than were expected. For example, *put*, *set*, and *cause* in SemCom2 were exceptionally judged unnatural and processed slower and *give* and *bring* in SemCom1 were unexpectedly processed slower. Also, the verbs that are claimed not to occur in the DC, such as *present, donate, provide, push, whisper, choose* and *say* were judged more natural and processed faster than the verbs in SemCom5. I will discuss what semantic properties led these results and also examine coercion in more detail in 5.5.

5.5. Semantics and Coercion of Individual Verbs

The usage-based model predicts general correlation between the linguistic knowledge and use; it does not predict exact correlation. Therefore, we can expect that there are some cases where the linguistic knowledge and the patterns shown in the usage are not perfectly correlated. From the corpus analysis and experiments, I showed that there are general correlation between the linguistic knowledge and usage and there are some exceptional cases where they are not correlated.

In this section, I will discuss how the verbs that are not perfectly compatible with the DC can be used and how the incompatibility is resolved by investigating the data from all aspects: semantic compatibility, frequency, processing effort, and acceptability judgments. I will examine not only the verbs where linguistic knowledge of semantic compatibility is correlated with the usage but also the verbs where there is discrepancy in correlation, in which case, I will further discuss how we can explain the discrepancy.

In order to discuss semantic compatibility and coercion in more detail, I will refer to the intuition of the native speakers of English obtained from informal interviews. The aim of the interviews was to elicit the linguistic or non-linguistic context where the incompatibility can be resolved. Since the interview answers are supplement of the experiment to the experimental results, I will not report the results in a separate section by dealing with it extensively.

The interview was conducted after the analyses of the experiment of naturalness judgments and processing time were completed. Six undergraduate students of Rice University, who were different from the participants for the processing time experiment, came to the linguistics lab individually by appointment.

There were two sets of tasks, and the procedure of each task was the same for both sets. For each task, the participants were given slips of paper on which a sentence and its possible interpretation were written. The sentences were selected from the experiment materials. For the first set, the interpretation of each sentence was ‘the Recipient received the Patient,’ in which the Recipient and the Patient were replaced with the corresponding word of the given sentence. They were also given six baskets to put the slips in. Each of the 6 baskets corresponds to a score from 1 to 5 (1 = “I agree with the interpretation” / 5 = “I do not agree with the interpretation”), plus a basket labeled "it doesn't make any sense.” They sorted the sentences into these groups. The same task was repeated for the second set where the sentences were the same as the ones in the first set but the interpretation was ‘the Recipient was benefited by the action.’ Again, the Recipient in the interpretation was replaced with the corresponding word of the sentence.

After they finished sorting the sentences, they were asked some questions relating to their decision. The questions were about the linguistic or non-linguistic context where any incompatibility between the verb and the construction is resolved and the sentence can be interpreted.

In the following section, I will refer to the result of the interview when necessary.

5.5.1. Verbs of inherent transfer

I predicted that verbs in SemCom1 (i.e. verbs inherently signifying giving) would be judged most natural and processed fastest since these verbs are semantically highly compatible with the DC, and thus there would be no or little coercion.

As a result, *send, promise, leave*, and *tell* showed smallest NatScores and ProcessingTs in general, meaning that the processing cost of these verbs for the coercion was minimum compared to that of the other verbs and the co-occurrence of these verbs and the DC are judged quite natural as a result of the processing.

As I discussed in 5.4.2, the unexpectedly slow processing time of *give, bring*, and *fax* can be explained by the large standard deviation of the ProcessingT of these verbs.

Interestingly, *give* was ranked 7 in the order of NatScore and 21 in the order of ProcessingT. If we recall the result from the collexeme analysis that *give* was the verb that was the most frequently associated with the DC and this verb is considered as the most prototypical verb that occurs in the DC, the relatively low rank of *give* in NatScore and ProcessingT are unexpected.

This difference in the results of experiment from the collexeme analysis is possibly due to the strong association of the DC and the pronoun Recipient in actual usage. On the other hand, in the experiment, the Recipient was controlled as a proper noun as I stated in 5.1.1.2. In the subcorpus of the BNC used in this study, more than half of the instances of the DC were used with *give* (out of 1452 instances of the DC, 755 instances were used with *give*), and among the 755 instances of *give* used in the

DC, 92.33% had a pronoun Recipient. This means that almost half of instances of the DC in the corpus were those where the verb was *give* and the Recipient was a pronoun. It is possible that this overwhelming raw frequency of pronoun Recipient used with *give* may have influenced the results of the experiment. However, in the experiment, when they read a proper noun right after *give*, they may hesitate at this position, which caused slower processing time, and judge the sentence not very natural because what they frequently hear and use after *give* is a pronoun rather than a proper noun. Thus, even though *give* was the most frequently associated with the DC and considered the most prototypical verb in the DC, in the experiment where the Recipient was controlled as a proper noun may sound not very natural and processed slower than expectation.

Among the future having verbs, which is a SemCom1 verb, *allow* was not frequently associated with the DC according to the collexeme analysis. As a result of the experiment, this verb was neither judged natural nor processed fast. As I have observed in 4.3.3.1, *allow* has the meaning of 'future having' only when it occurs in the DC. When it occurs in other constructions such as [V *to*-infinitive-small-clause] as in *The Government will allow them to advertise on radio and television*, *allow* does not mean 'future having.' Rather, the Agent permits the other person to do an action. Note that the Agent does not actively participate in the action in the complement. In this expression, the Government, the Agent has the control over their advertisement, and the Agent removes a barrier (Talmy 2000) so they can advertise, but the government does not advertise. In short, even though *allow* is said to occur in the DC according to Goldberg (1995) and Pinker (1989), its basic meaning is 'to permit' rather than 'future having' or 'transfer.'

In addition, even if *allow* is used in the DC as in (132), the Agent is not a person who 'gives' something because he/she does not have to be a person who originally owns the Patient and transfers it to the Recipient.

(132) Well, I was *allowing* you time with your leg we thought you've got the telly on loud. (BNC_KD8)

Instead, as in the basic meaning of *allow* where the Agent has the control over the other person's action, in the DC, the Agent is the person who has the control over the Recipient's possession of *time*. By "allowing the Recipient *time*," the Agent removes a barrier so that the Recipient can have it. However, just as the Agent of *allow* used with *to*-infinitive clause does not actively participate in the action designated by *to*-infinitive clause, the Agent in (132) does not actively 'transfers' it to the Recipient. Considering that the meaning of the DC is a successful transfer of a Patient from an Agent to the Patient, we cannot simply say that the meaning of *allow* is coerced to the meaning of transfer because the Agent does not 'transfer.' In this case, the transferring meaning of the DC is conceded in order to conform to the verb meaning, 'permission,' and thus the whole expression is interpreted as 'to permit someone to have the Patient.' Coercion has been defined as such that the verb meaning conforms to the constructional meaning, but in the case of *allow*, the constructional meaning (i.e. transfer) is rather suppressed. On the other hand, the Recipient's possession came from the constructional meaning. In other words, both the constructional meaning and the verb meaning are adjusted when they occur together. In conclusion, unlike the observation of Goldberg (1995) and Pinker (1989), *allow* is not very semantically compatible with the DC because the basic meaning of *allow* is not transfer. Therefore, *allow* requires coercion when it occurs in the DC. For this reason, it is not frequently associated with the DC, not judged very natural, nor processed very fast.

Next, let us examine *promise*. In 4.3.3.1, I conjectured that *promise* may not be semantically very compatible with the DC because the central meaning is not ‘transfer’ but ‘telling the other person that you will definitely do an action.’ Like *allow*, *promise* also occurs in other constructions such as with *to*-infinitive complement or sentential complement as was discussed in (70) in 4.3.3.1. However, *promise* was relatively frequently associated with the DC as we observed in Chapter 4. This suggests that *promise* may be semantically more compatible with the DC than I had thought in the beginning, and this was supported by the experimental results. The NatScore of *promise* was the third most natural (1.22), and the ProcessingT was the fourth fastest (752.74) among the 35 verbs. Based on the results from the collexeme analysis and experiments, I suspect that *promise* may be more compatible with the DC than I expected.

When we examine the semantics of *promise* closely, we can see the difference of *promise* from *allow*: the Agent in *promise* actively participates in the event that he promised. Let us examine (133).

(133) a. Steve *promised* he would get them all transcribed. (BNC_KPV)

b. He had *promised* that the rich and privileged would no longer get preferential treatment. (CCELD)

In (133a), *Steve* is the person who promises and at the same time, the person who will do the action indicated in the SC. Even when the subject of the sentential complement is different from the person who promises as in (133b), *he*, the promiser, will actively act to make his promise realized.

Even in the DC, the difference of *promise* and *allow* is still applicable. When *promise* occurs in the DC as in *I did promise you a doggy*, *I*, the Agent, promises that he will give a doggy in the future by any means; he can buy or adopt a dog and give it to him. Unlike *allow* in the DC, the Agent of *promise* actively participate in 'giving' event when it occurs in the DC. Therefore, in the DC, the transferring meaning of the DC does not have to be suppressed. For this reason, I conclude that *promise* is more compatible with the DC than *allow*.

Next verb to be discussed is *owe*. The verb *owe* is semantically compatible with the DC as one of the future having verbs, and according to the collexeme analysis and the experiment, it was frequently associated with the DC and was processed relatively fast. However, the NatScore of *owe* (4.60) was not as good as the other verbs of SemCom1 (the average NatScore of SemCom1 verbs excluding *owe* was 1.95, and the difference was significant ($t(26) = 8.35$, $p < .001$)).

If we consider the frequent association with the DC and fast processing time, it seems that people judged the sentence with *owe* somewhat unnatural not because *owe* was incompatible with the DC, but because the Patient in the experiment sentence was not natural to occur with *owe*. The Patient of *owe* in the stimulus sentence was *the watch* as in *Larry owed Jane the watch,* and *the watch* may have not sounded good to occur with *owe*.

If the verb were *give* or *send* and the Patient were *the watch,* the sentence would have been judged more natural than the case of *owe*. This is because *give* or *send* does not restrict the semantic properties of the Patient as long as it is small enough to be transferred or the ownership can be transferred. On the other hand, as I observed in the corpus, *owe* particularly prefers money than an object. In the corpus, out of 16 instances of *owe* used in the DC, 11 instances were money (e.g. *the money, that nine pound*, *five pound*, etc) and the other 5 instances were *something* and *nothing*. In short, *owe* frequently occurs with a noun related with money. Also, the participants of the interviews coherently answered that when the Patient was money, the sentence sounded more natural than when it was a small object like *the watch*. For example, the participants in the interview judged (134a) more natural than (134b) and (134c).

(134) a. David owed Kate *$5*.

b. Kelly owed Sam *a watch*.

c. Larry owed Jane *the watch*.

Moreover, if the Patient in the stimulus sentence were *a watch* instead of *the watch*, it could have been judged more natural. In the interview, participants said that (134b) is better than (134c). It is probably because a Patient in the DC is likely to be indefinite rather than definite (Bresnan 2007). Also, it is hard to imagine a situation where the Agent pays back with a particularly designated entity. If John borrowed a watch from Jane, he may pay back with money of equivalent value or by purchasing a watch of the same kind. On the other hand, to pay her back with the watch that he borrowed is not natural.

However, if *owe* does not mean 'future having' as in (135), it does not have to occur with money or an entity.

(135) I *owe* him *my life*. (CCELD)

In (135), *owe* does not mean 'future having' because *I*, the Agent, cannot transfer *my life* to *him*. Rather, the meaning is 'I have my life because of him.' I may be able to pay him back with other entities such as assets or money in the future or I can metaphorically give him my respect or gratitude as if I have something to pay back.

Therefore, we can say that there is a semantic restriction of *owe* for the noun in the Patient position that it is money or an entity of indefinite property so the Patient will be transferred in the future. Or the Patient is an abstract noun that cannot be directly transferred. If the Patient does not meet these properties, the co-occurrence of *owe* and the noun may be unnatural.

When we look at the result from the experiment, the processing of *owe* was pretty fast (the 5th fastest). Recall that the ProcessingT was measured by adding the proceesing time for the Recipient and *the* in the Patient NP. Therefore, up to the point of *the*, participants don't know what noun will come for the Patient noun. They process the phrase [*owe* Recipient *the*] quite easily because they expect money or abstract noun to follow. However, when they finish processing the whole sentence and found out that the Patient was *the watch*, they judge the sentence unnatural.

The example of *owe* shows that some verbs are semantically compatible with the DC only when the semantic properties of the co-occurring Patient noun are satisfied.

5.5.2. Verbs of possible transfer

When looking at the NatScore and ProcessingT of the verbs of possible transfer, the verbs of ballistic motion, creation, and obtaining verbs are judged second most natural and processed second fastest among the SemCom categories. The basic meaning of these verbs involves two salient participants, i.e. Agent and Patient, but not the Recipient. However, the Patient is not damaged by the action designated by the verb, so it can be transferred to the Recipient when it occurs in the DC. I expected that they are not judged as natural and not processed as fast as the verbs of inherent transfer because these verbs are not as compatible as the verbs of inherent transfer and the participants will take more processing time to resolve the incompatibility.

As I analyzed in Chapter 2 and 4, when the ballistic motion verbs such as *throw* and *drop* occurs in the DC, the basic meaning of these verbs are interpreted as a means of the caused motion of transfer: how the Patient is released so it can be transferred to the Recipient. Throw was in the second best group for NatScores and ProcessingTs, which is in accord with the prediction. Interestingly, however, *drop* was judged not very natural in the DC (NatScore of drop was 5.07 and the average NatScores of other SemCom2 verbs, excluding *drop* was 3.81, and the difference was significant ($t(26) = 2.93$, $p < .01$)) while it was processed fastest among 34 verbs. At this moment, there is no way to explain this unexpectedly fast processing time.

The verbs of creation such as *cook* and *create* also require some degrees of coercion because it is not perfectly compatible with the DC. These creation verbs are coerced to be interpreted as the prior event of transfer as I analyzed in Chapter 3 and 4. Note that *create* was processed relatively fast (13th fastest) when compared with its rank in NatScore (26th most natural). Even though the participants did not entirely reject *create* in the DC as the NatScore of 5.60 implies, people did not like this verb occurring in the DC, either. When people are asked to judge the naturalness of the sentence, the morpho-syntactic criterion that Gropen et al. (1989) proposed seems applicable: the verbs of Latinate origin are not likely to occur in the DC. When the participants finished reading the sentence and judge its naturalness, they have time to recall that *create* is one of the Latinate verb, based on its morpho-phonemic information, even though they do not consciously recognize it. They will realize that such Latinate verbs are not frequently used in the DC, and therefore, they will judge the sentence not very natural. However, as we can see in Figure 14, *create* neatly belongs to the second group in ProcessingT. This means that *create* is one of the verbs processed second fastest among the five verb categories. This processing time result suggests that when the participants process it, it seems like the semantic properties of *create*, which is "possible transfer," overrides the morpho-syntactic criterion. The difference in NatScore and ProcessingT of *create* suggests that the semantic criterion and other criteria such as the morpho-syntactic criterion sometimes compete. The competition between the morpho-syntactic criterion and semantic properties will be discussed more in 5.5.6 when verbs of fulfilling are dealt with.

The obtaining verbs such as *buy, rent*, and *find* are also judged second most natural and processed second fastest among the five verb categories. When used in the DC, the meaning of these verbs is interpreted as the prior event of transfer: the Agent obtains the Patient or brings the Patient in his/her control and then, transfers it to the Recipient. As we saw in Chapter 4, *buy* was more frequently associated with the DC compared with the other verbs in SemCom2. However, when we look at the results from the experiment, the NatScore and the ProcessingT of *buy* was not very different from the other verbs in the SemCom2. It is frequently associated with the DC possibly because we more often experience situations where we buy something for other people than the situations where we *find* or *rent* something for other people. When we process it and judge the naturalness of *buy* in the DC, however, we may depend on the semantics. As an obtaining verb, it is processed as fast and judged as natural as the other obtaining verbs such as *find* and *rent*. The case of *buy* shows that sometimes the semantic knowledge and frequency pattern do not correlate. However, if *buy* is frequently used in the DC recurrently, it may influence on the semantic knowledge about their compatibility, and change it eventually.

There are verbs in SemCom2 that were not mentioned by the Pinker (1989) and Goldberg (1995) to occur in the DC but actually occurred in the corpus. They are the verbs of placement (*put* and *set*) and verbs of general causation (*cause*). I categorized them in the SemCom2 because the Patient is transferrable intact if it occurs in the DC. However, if we look at the semantics of these verbs more closely, we can notice that the detailed semantic properties make these verbs less natural to occur in the DC than the other verbs in SemCom2.

For example, as I discussed in 4.3.3.2, *put* and *set* strongly evoke a location to which the Patient is moved. It is possible that these verbs are so strongly associated with the Location that it may be difficult to conceive a Location as a Recipient. The Location is usually expressed in the PP as in *Leaphorn put the photograph on the desk* (CCED_AL). Because of the strong association of *put* and *set* with Location, they are strongly associated with the PP construction rather than the DC. In the corpus analysis in Chapter 4, *put* was relatively frequently associated with the DC while *set* was not. However, in the experiment, both verbs were judged relatively unnatural and they were processed relatively slow. Therefore, as the experiment results show, when *put* and *set* occur in the DC, people had difficulty in coercing the verb into the meaning of transfer of possession, and judged the sentence unnatural. The strong association with the Location in the cases of *put* and *set* is worth studying with corpora, but I will leave it to future study.

Cause also doesn't seem to be coerced easily. As I have discussed in 4.3.2.7, coercion of *cause* into the transferring meaning involves several metaphors (a caused event is understood as a transferred entity, a causing event is understood as transferring event, and a person who suffers a caused event is understood as a Recipient). However, as was shown in 4.3.2.7, there is a semantic restriction not only when it occurs in the DC but also in the monotransitive construction: the Patient of *cause* is an event with a negative connotation. I claimed in 4.3.2.7 that in order for the verb to be coerced to occur in the DC, the semantics restrictions on the argument should be satisfied in the monotransitive construction.

However, I did not use a verb with a negative connotation such as *problem* and *trouble* in the experiment because I controlled the number of syllables in the Patient noun as one and the frequency as 20-130, and these nouns were less frequent than this frequency. Moreover, the aim of the study is to see if a verb is semantically compatible with the DC, not with the nouns following the verb. The prototypical meaning of the DC does not specify the negative or positive connotation of the Patient. Therefore, it would be more reasonable to use a noun of neutral connotation across the sentences rather than to use a noun according to the semantic requirement of the verb.

In the experiment, the target sentence of *cause* was (136).

(136) Kevin *caused* Liz the fire four minutes ago.

(137) Kevin *caused* the fire.

The noun, *fire*, by itself, can be considered to have a neutral connotation (either positive or negative). It can be conceptualized as an entity as in *Prometheus gave fire to mortals* but at the same time, it can be an event like the situation where Liz's house was caught in fire. When *fire* occurs with *cause* in the monotransitive construction as in (137), it is considered as a negative event where the fire caused by the Agent resulted in damage. It seems that we usually expect that the caused event designated by the noun used with *cause* is negative. In other words, *cause* is expected to carry a negative connotation.

When a Recipient is added and the expression becomes the DC, the meaning that the Agent's action of causing a negative event, and the benefactive meaning of the DC clash. When the verb meaning and the construction meaning are incompatible like this, we have to coerce it. We can coerce it with several metaphors stated earlier, but the benefactive meaning of the DC is overridden by the verb meaning, "causing a negative event," and this resulted in slower processing time of (136).

If the Patient were a noun of negative connotation such as *problem* or *trouble*, people would process the sentence faster than (136), presumably because the negative meaning of the noun helps interpretation into the malafective meaning. This needs more experimental study.

In sum, the verbs of possible transfer (SemCom2) were, in general, processed second fastest and judged second most natural. When the experiment results and semantic compatibility or frequency were not correlated, I presented plausible explanation: for some verbs (*owe, put, set*, and *cause*), other linguistic elements, such as Patient, restrict speakers to coerce the verb meaning to the constructional meaning easily, or sometimes, the constructional meaning is overridden (*cause*). For some verbs, when we process the co-occurrence of a verb and a construction the central meaning of the verb may play a more important role than the other factors such as frequency (*buy*) or morpho-syntactic criterion (*create*).

5.5.3. Verbs of prevented transfer

I expected in 3.2.2.3 that the verbs of prevented transfer such as *refuse* and *deny* would be judged third most natural and processed third fastest among the five compatibility categories. As we have seen in Figure 12, Figure 13, Figure 14, and Figure 19 in 5.4, this prediction was confirmed.

Since there is no verb that deviates from the predicted correlation and the coercion of these verbs are extensively discussed in Chapter 3 and 4, I will briefly summarize the semantics and coercion of the verbs again in this section.

As discussed through (94), in Chapter 4, repeated in (138), the Recipient wants to receive the Patient from the Agent.

(138) … they [the banks] *refused* her money to keep the farm going. (BNC_KB0)

In (138), *refused her money* is interpreted as 'refuse to give her money.' The meaning of transfer comes from the DC because the basic meanings of *refuse* and *deny,* outside of the DC, are not relevant with transfer: Their basic meanings are 'not allow an action' or 'perform speech action that negates the following proposition' respectively. Because the negative meaning of these verbs, when they occur in the DC, the transfer fails.

5.5.4. Verbs of impossible transfer

The central meaning of *cut* and *break* involves damage on the Patient (e.g. *I broke the machine* and *I cut the string*). As I discussed earlier in 3.2.2.4, when a person receives something, we expect that the person is benefitted by receiving it. Therefore, we do not expect that the person receives something damaged. Therefore, I predicted that *cut* and *break* would be semantically less compatible with the DC, less frequently associated with the DC, judged less natural, and processed slower than the verbs in SemCom1, SemCom2, and SemCom3.

The verbs of impossible transfer followed this prediction as the results from the experiment: they were judged forth best natural and were processed forth fastest. As we saw in Chapter 4, *cut* and *break* did not occur with the DC at all in the corpus. However, people did not judge *cut* and *break* totally unnatural: the average NatScore of these verbs was 4.65 along the 7 point scale. This means that people could make sense out of their co-occurrence even though it requires processing effort: the average ProcessingT of *cut* and *break* was 877.09, which was the forth fastest among the five categories.

Interestingly, *cut* was judged more natural and processed faster than *break* when occurring in the DC. For example, the target sentences used in the experiment were (139).

(139) a. Robert *cut* Jane the belt last winter.

b. David *broke* Jen the bread six hours ago.

In the experiment, the average NatScore of *cut* was 3.89 whereas the average NatScore of *break* was 5.41 ($t(26) = 3.34$, $p < .01$). The ProcessingT of *cut* was 795.85 whereas that of *break* was 958.33 ($t(26) = 2.10$, $p < .05$).

It seems that when the action designated by the verb can be coerced to involve the meaning of creation, the verb is likely to occur in the DC more naturally. The verb *cut* itself does not necessarily involve the meaning of creation. For example, in *Mrs. Haines stood nearby, holding scissors to cut a ribbon* (CCED_AL), the action of cutting does not create anything. However, it seems that people can easily imagine a situation where a person creates a piece out of something by cutting. In the interview, the participants answered that (139a) can be used when Robert cuts a leather, makes a belt out of it, and gives it to Jane. The verb *cut* is interpreted more like a creation verb and coerced into the meaning of transfer.

On the other hand, the participants of the interviews had trouble with imagining that the action of breaking creates something. They wanted to use the particle *off* to designate the result of the breaking action and rephrased (139b) as 'David *broke off* the bread and gave it to Jane.' Also, when the Patient was a candy or a candy bar as in *David broke Jane the candy*, they said that it was hard to imagine that the action of breaking creates anything and transfers it. Instead, they added that the sentence could be read as benefactive if the Recipient wanted the bread or the candy broken into pieces. In this case, they said that transfer was not likely to happen. This benefactive meaning comes from the meaning of the DC because the verb *break* itself does not carry the benefactive meaning.

The verbs of impossible transfer suggest the interaction of the verb meaning and the constructional meaning when coercion occurs: some semantic properties of the verb and construction are suppressed while the others become more salient. This interaction challenges the one-way direction of coercion proposed by Override Principle (Michaelis 2005) that people try to coerce the verb meaning into the constructional meaning. For example, when *cut* is used in the DC, people coerce the meaning of *cut* in the way that the creation meaning gets more prominent than the meaning of damage so the created pieces can be transferred. As in the case of *break*, even though people cannot coerce the meaning of the verb into the meaning of transfer, at least, they try to coerce it into the implicit constructional meaning, which is the benefactive meaning. *Break* seems to be hard to be interpreted as a creating action in any ways. Nevertheless, when it occurs in the DC, people still try to imagine a situation where the Recipient wanted the Patient to be damaged so the Recipient is benefited. Coercion of *cut* and *break* shows how people compromise the conflict between the verb meaning and the constructional meaning: if possible, they conform the verb meaning to the constructional meaning as in the case of *cut* by making some semantic properties (e.g. creation) more prominent while suppressing others (e.g. damage). In this case, the prominent meaning of the construction overrides the prominent meaning of the verb. Sometimes, we may suppress the salient meaning of the construction (e.g. transfer) in order to resolve the conflict as in the case of *break*. In this case, the prominent meaning of the verb overrides the prominent meaning of the construction. This implies that the lexical meaning and the construction meaning interact to resolve the incompatibility between them, not in one-way direction that the constructional meaning wins out.

Note that coercion of *break* takes more processing cost as the processing time results show: the ProcessingT of *break* was slower than that of *cut*. This is probably because people have to suppress the more salient meaning of the DC and profile the less salient meaning of the DC. People may try hard to compromise the meaning of transfer denoted by the DC and the resulting situation of the breaking action. If they determine that physical transfer is impossible, they bring less salient benefactive meaning into profile and interpret the collocation of *break* and the DC as 'break something for the benefit of the Recipient.' It seems that coercion by suppressing the prominent meaning and profiling less salient meaning of the DC (as in the *break* case) is more difficult than suppressing the prominent meaning and profiling less salient meaning of the verb (as in the cut case). This more difficulty in coercion is reflected in slower processing time of *break* than *cut*. Thus, people judge the sentence with *break* less natural than the sentence with *cut*. Also this type of coercion is less likely to happen: the corpus data shows that *break* is not used in the DC.

5.5.5. Verbs of events internal to the Agent

The central meaning of the verbs belonging to SemCom5 (i.e. verbs of events inherent to the Agent) is that the event occurs only in the dominion of the Agent so there is only one salient participant in the event scene such as *stay* and *sneeze* or the event occurs in the mind of the Agent as in the cases of *think* and *want*, so the event does not affect the other participant in the event. These verbs will be even more difficult to be used in the DC because there is nothing to be transferred or even no one to be affected by the action.

These verbs did not occur with the DC in the corpus as we saw in Chapter 4. The results from the experiment also followed the prediction in that the verbs were judged least natural (the average NatScore of 6.56) and processed slowest (880.73ms) compared with the verbs in the other semantic compatibility categories.

Specifically, the intransitive verbs such as *stay, think*, and *sneeze* were judged the least natural. In 3.3, I expected that *sneeze* would show a bit better NatScore and faster ProcessingT than the other two verbs, because *sneeze* can sometimes occur in the caused-motion construction as in (140). When *sneeze* was used in the caused-motion construction, *sneeze* is interpreted as the manner in which the motion is caused. If it is used in the DC, it could be interpreted as the means of transfer. Thus, I tested this verb with the target sentence (141).

(140) She *sneezed* the foam off the cappuccino. (Goldberg 2006: 42)

(141) Thomas *sneezed* Ann the milk while they were reading the books.

However, it was judged as bad as *stay* and *think*. Even though sneezing action has a force that can cause something to be moved, we cannot control the strength or the direction of the force when sneezing in practice. On the other hand, the transfer expressed by the DC is an action controlled by the Agent: the Agent controls the force and the direction so that the Recipient can receive the Patient. Therefore, *sneeze* is semantically as incompatible as the other verbs of events inherent to the Agent, and the experimental results were correlated with the semantic compatibility.

Also, as I had expected, *want*, one of the "verbs of hope," was judged not very natural (6.48 in NatScore, 28th most natural) and processed slow (32the fastest) among 35 verb. This is because to want something occurs only in the person's mind but actually does not influence on the entity itself.

However, *wish* showed different result from the other verbs of event internal to the Agent. I categorized *wish* as SemCom5 verbs because it was similar with *want* in that it expresses the Agent's hope or desire. Also, outside of the DC as in *I just wish I could do that again*, *wish* does not have the meaning of transfer or it does not require a Patient that may be or may not be transferred later like the verbs in SemCom2, SemCom3, and SemCom4. However, the result from the collexeme analysis showed that *wish* is frequently associated with the DC as shown in 4.3.2.6. Based on the result of the corpus analysis, I proposed that *wish* may be semantically more compatible than the other verbs of hope because *wish* has a performative sense. As the result of the processing time experiment shows, *wish* was relatively processed fast when it occurs in the DC (8th fastest among 35 verbs). This result suggests that *wish* is actually more semantically compatible with the DC than the other verbs in SemCom5, so it does not require a lot of processing effort when it is coerced.

However, the naturalness score was not very high for *wish* (NatScore of 6.15). It seems that it was judged relatively unnatural because the Patient position used in the experiment was not very compatible to occur with *wish*. Usually, *wish* in the DC occurs with a Patient which has the semantics of 'pleasant event' such as *a merry Christmas*, *a happy new year*, *good luck*, *best*, and so on. A pleasant event is natural to occur in the DC because the DC carries a benefactive meaning: we usually wish a good thing for someone. If the Agent wishes the Recipient a pleasant event, the Recipient receives the wish about the pleasant event because *wish* functions as a speech act verb when used in the DC (see 4.3.2.6). The Recipient is benefited psychologically.

The experiment result supported the semantic restriction on the Patient of *wish*. The target sentence used in the experiment was (142a) and I compare it with (142b) in the interviews.

(142) a. Sophie *wished* Ted <u>the dream</u> last night.

b. Alex *wished* Jill <u>sweet dreams</u> last night.

The Patient noun in (142a) was *the dream*. The noun, *dream*, itself does not have to be a pleasant event. I deliberately used a noun of neutral connotation in order to test whether the semantic property of the Patient is restricted. However, in the interview, the participants answered that (142a) is not very natural because we don't know if the dream was a good thing or not. Therefore, if a noun of neutral connotation occurs with wish in the DC, the sentence does not sound very natural. On the other hand, (142b) was judged to be a good sentence by the participants of the interviews. The difference was the Patient NP which was a good event in the case of (142b).

Therefore, I conclude that *wish* and a noun of pleasant event is the most compatible. I claim that *wish* is another example, along with *owe* and *cause*, that the semantic properties of the Patient noun is restricted in order to occur in the DC.

In conclusion, except for *wish*, the results from the experiment show that the verbs of the events internal to the Agent are the most difficult to be coerced. The central meaning of the verbs is so incompatible with the constructional meaning that people had trouble with resolving the conflict. They may try hard to resolve it as the slowest processing time suggest. Nevertheless, they fail to resolve the conflict and make sense out of the collocation or even though they resolved the incompatibility, the co-occurrence was very unnatural.

5.5.6. Verbs that are known as 'not occurring in the DC'

The verbs such as *present, provide* and *donate* (i.e. the verbs of fulfilling) were expected to be judged as unnatural as the verbs in SemCom5 because they are known as not occurring in the DC according to previous researches (Goldberg 1995, Pinker 1989). However, these three verbs were judged quite natural (2.91) which was judged more natural than the verbs in SemCom2, SemCom4, and SemCom5 (c.f. Table 20). For example, *provide* not only actually occurred in the corpus but also were judged relatively natural (2.78 on the scale of 7 as shown in Table 19) and *present* and *donate* were also judged relatively natural (2.15 and 3.81 respectively) even though these two did not occur in the corpus. Also, their processing time was faster than the verbs in SemCom4 and SemCom5 (c.f. Table 21), meaning that people didn't have as much difficulty when they coerce these verbs as when they coerce the verbs in SemCom4 and SemCom5.

Based on Pinker's observations on the DC (Pinker 1989:110-123), the verbs of fulfilling are not perfectly compatible with the DC because the morpho-phonemic distinction between Latinate versus native verbs and the indirect relation between the Agent and the Recipient may prevent the verbs of fulfilling from occurring in the DC. The empirical evidence presented in this study supports this observation in a way because these verbs were less frequently associated with the DC than the verbs of SemCom1 or did not occur in the DC (c.f. Chapter 4), and were not processed as fast and judged as natural as the verbs of SemCom1. However, it is also shown that people do not totally prevent the co-occurrence of the DC and these verbs, which is against Pinker's claim.

I claim that the general semantics of these verbs, following the semantic criteria stated in 3.2.1, overrides the morpho-phonemic criterion or the specific semantics like indirect relation between the Agent and the Recipient, discussed in 3.3. Semantically, the verbs of fulfilling are similar with the verbs inherently signifying giving in that there are three participants in the event scene, and the Patient is transferred from the Agent to the Recipient. These semantics properties are the ones that the DC requires for the verb in order to be compatible. Therefore, the semantics of the verbs of fulfilling were judged relatively natural and processed relatively fast. Also, some of the verbs like *provide* are actually used in the DC as shown in the results from the corpus study and internet search in 4.3.3.4.

Verbs of continuous causation of accompanied motion in some manner such as *pull, carry, push, schlep, lift, lower* and *haul* are said to be unacceptable to occur in the DC (Goldberg 1995: 128). These verbs specify a manner with which the Patient is caused to move and how the force is exerted on the Patient continuously but the Patient can be used with or without a Goal as in (143a) and (143b), respectively.

(143) a. They *pushed* him <u>into the car</u>. (CCED_AL)

b. He put both hands flat on the door and *pushed* as hard as he could. (CCED_AL)

In the subpart of the BNC used in this study, there was no instance where the verbs like *push* occur in the DC and this seems to support the claim that these verbs do not occur in the DC. However, *push* was judged 16th natural in the NatScore (3.07), which is relatively natural, and was processed 20th fastest among 35 verbs. The experiment results suggest that we can coerce *push* into the meaning of transfer more easily than has been known. For example, the target sentence used for the experiment was (144).

(144) Eddie *pushed* Beth the plate five minutes ago.

This sentence can be interpreted as 'Eddie transferred the plate to Beth by pushing it so she can receive it.' Bath is conceptualized as a Recipient. Semantically, the co-occurrence of these verbs and the DC does not have to be rejected because when the Agent exerts force to the Patient, the Patient can be moved to a certain point (Goal), and this Goal can be conceptualized as the Recipient. Therefore, even though not used frequently in the DC, the verbs of continuous causation of accompanied motion in some manner can be coerced relatively easily.

Next, the verbs of manner of speaking such as *shout, scream, murmur, whisper,* and *yodel* "describe the physical characteristics of a sound" rather than "an intended act of communication by speech" (Zwicky 1971, 225-226, as cited from Bresnan and Nikitina 2009). Since they require neither a listner nor a message transferred, they are not semantically very comapatible with the DC.

Actually, they did not occur in the corpus with the DC and the processing time was not very fast either. For example, the ProcessingT of *whisper* 30th fastest among 35 verbs. People took some time to process it because the verb and the construction were not very compatible and they had not heard the verb occurring in the DC very often, so their collocation may not be entrenched.

However, the NatScore (3.26, 17th most natural) shows that *whisper* can be coerced even though not very natural. Often, *whisper* describes the characteristics of the sound but it can be used as a communication verb like *tell* if we conceptualize it as the verb describing the characteristics of the manner how a message is conveyed to a listener.

(145) Susan *whispered* Matt the song last night.

In (145) was the sentence used in the experiment. Its interpretation is 'Susan sang the song by whispering manner so Matt can listen to it.' In the DC, *whisper* is coerced to the meaning of metaphorical transfer (i.e. communication), and the basic meaning of *whisper* is interpreted as the manner of speaking.

Consequently, the acceptability judgment result implies that there is a possibility that the verbs of manner of speaking can be coerced if proper context can be posited.

The verbs of proposition and propositional attitude such as *say, assert, question, claim*, and *doubt* are similar with the verbs of manner of speaking in that both verb categories do not require a listener. These verbs profile the content of the spoken message as I discussed in 3.3. For example, in *"I'm sorry," he said* (CCED_AL), the listener to whom the message is transferred is not specified but its content "I'm sorry" is fully expressed. If the listener is to be expressed, PP is used as in *I packed and said goodbye to Charlie* (CCED_AL).

In this experiment, I tested *say*. This verb should be able to be coerced so it could be used in the DC because it seems that the listener should be able to be conceptualized as the Recipient of the said message and the message is metaphorically transferred to the listener. Nevertheless, it was not used with the DC in the corpus, judged not natural (NatScore of 6.07) and processed quite slowly (29^{th} in ProcessingT). This means that *say* is hard to be coerced into the DC. Recalling that *whispe*r, which doesn't necessarily occur with the listener and even with the content, could be coerced, the reason why *say* is hard to be coerced is not certain. This should be studied more in the future.

Also, verbs of choosing such as *choose, pick, select, favor,* and *indicate* should be studied more. The target sentence used in the experiment was (146).

(146) Thomas *chose* Jen the pot five minutes before the show.

The NatScore of *choose* was not very good (NatScore of 6.19). It is possible that people judged the sentence not very natural because the time when the event occurred was unnatural: 'choosing the pot for Jen' and 'before the show' do not seem to be relevant. In the interviews, I tested (147), expecting that people would judge (147) more natural than (146) if the adverbial phrase were something more general like *last night* as in (147).

(147) Thomas *chose* Jen the pot last night.

However, out of six participants of the interview, five answered that (146) and (147) are equally bad while only one person liked (147) a bit better. The participants' answers confirm the result from the experiment that *choose* is relatively unnatural to occur in the DC regardless of the adverbial phrase.

The verbs of choosing may not be compatible with the DC probably because the action of choosing does not have to involve any type of motion at all. In other words, choosing something can occur only in a person's mind just like the cases of verbs of events internal to the Agent. For example, Thomas can choose a pot by deciding which to buy or which to pick up in mind but it does not mean that he necessarily pick it up to give it to Jen. If *choose* is more like one of the verbs of events internal to the Agent, it is not semantically very compatible with the DC. Therefore, when this verb occurs in the DC, it is judged relatively unnatural.

Note that the results of *choose* from the corpus analysis and the naturalness judgments scores correlate with each other: it does not occur in the corpus and was judged relatively unnatural. However, the processing time is not correlated: *choose* was processed relatively fast (ranked as 16 among 35 verbs). At this moment, I cannot find the reason why the result of the processing time does not correlate with the other factors. Coercion of *choose* in the DC may be further studied in the future.

5.6. Summary

In this chapter, through the experiment, I obtained the data of processing time and naturalness judgments about the co-occurrence where the DC is used with verbs of various degrees of semantic compatibility. Through the correlation analysis, regression, and the linear trend of processing time and naturalness judgments, I showed that the processing time and naturalness judgments are correlated with semantic compatibility and frequency pattern.

Overall, this correlation supports that the processing time and the naturalness judgments are gradable, as the semantic compatibility and frequency pattern of the co-occurrence of a verb and the DC are gradable. This implies that coercion is not just a theoretical explanation about cases where there is incompatibility between a verb and a construction and the incompatibility is resolved, but a psychological phenomenon that involves processing effort, frequency, and judgments of different degrees.

Consequently, the correlation shown in this chapter supports the prediction of the usage-based model presented in 1.4, that the semantic compatibility between linguistic units can be explained by categorizing relationship among the linguistic units, and this linguistic knowledge is closely related with language use.

Slower reaction time to process the co-occurrence of a verb and the DC suggests that their co-occurrence is hard to be categorized in the schema of the verb and the DC because the semantic specifications of the instance do not perfectly fit the schemas of the verb and the construction. In other words, the verb and the DC are not perfectly compatible so that they can occur together without any trouble. Therefore, people had more difficulty in order to resolve the semantic incompatibility between the verb and the construction. Consequently, the processing time is closely related with the effort of coercion. For example, verbs of inherent transfer (e.g. *send* and *tell*) are compatible with the DC. This semantic compatibility arises from the frequency in use and cognitive entrenchment of similar patterns, and in turn, they will be activated together frequently due to the entrenchment. Therefore, the verbs and the DC are likely to be used frequently. Also, when these verbs occur in the DC, people do not have to resolve any incompatibility or even if there is any incompatibility, they take very little effort to resolve the incompatibility because this incompatibility is not great. Therefore, based on the semantic knowledge about the verbs and the DC, frequent usage, and little processing effort, people judge the collocation very natural.

However, verbs of events internal to the Agent (e.g. *think* and *stay*) are so incompatible with the DC that they are not likely to be activated together. Therefore, they are not likely to co-occur. Also, it is very hard to resolve the verb meaning and the constructional meaning, implying that it costs longer processing time. Thus, the co-occurrence is judged unnatural. Even though people try very hard to resolve the conflict, the conflict may not be resolved in the end and people think that the collocation does not make any sense. Based on semantic incompatibility, infrequent usage, and difficult processing, they judge the collocation not natural.

On the other hand, if the compatibility between a verb and the DC is intermediate like *cook, refuse*, and *cut*, these verbs will be activated with the DC not very frequently: they may be or may not be activated depending on linguistic or non-linguistic context. Therefore, they will be used together not very frequently in practice. When the verbs occur in the DC, people try to resolve the incompatibility, but this resolution does not take as long as the cases like verbs of event internal to the Agent (e.g. *stay* and *think*). Based on the semantic knowledge, frequency, and processing effort, people will judge the sentence somewhat natural.

By investigating the individual verbs, I investigated what factors affect coercion in more detail. For example, *give* seems to be strongly associated with the pronoun Recipient. Some verbs, such as *cause, owe, put*, *set*, and *wish*, show exceptional pattern deviating from the correlation. The cases of *cause*, *owe*, and *wish* show that some verbs have quite specific selectional restrictions for the Agent and the Patient even in the constructions where the verbs frequently occur. If the properties of the

Agent and the Patient of these verbs do not meet the restrictions, the verbs are hard to be coerced. The verbs evoking a location such as *put* and *set* show that if a verb evokes an argument of specific properties (e.g. Location) too strongly, they can be hard to be coerced. In addition, *cause* and *break* show that sometimes, some semantic properties of the construction can be overridden by the verb meaning. In the case of *cause*, the benefactive meaning has to be suppressed, and in the case of *break*, transferring meaning should be suppressed.

Due to the limit of the experiments, I could not reflect all these various factors in the experimental design. Note that these verb-specific requirements are observed in the actual use (e.g. *Cause* is mostly used with the noun of negative event and *give* is frequently used with a pronoun Recipient; c.f. Chapter 4). Thus, if these factors were considered and the experimental stimuli were adjusted following these verb-specific requirements, I would obtain better correlation with the frequency. However, since I did not adjust the stimuli according to the verb-specific requirements, I could find what factors play a role if the incompatibility is resolved more easily. The detailed discussion on each verb showed that coercion is not just the semantic issues between the verb and the construction; rather, we need to take the other factors such as other linguistic factors and frequency into consideration.

Consequently, we can say that close examination of the coercion of the verbs reveals that coercion is a dynamic phenomenon where verbal meaning and constructional meaning compete in different ways and with different degrees of difficulty.

6. Implication and Conclusion

This study examined the nature of semantic compatibility between constructions and lexical items that occur in them and the nature of coercion, by using empirical data of language use from the usage-based approach (Langacker, 1988 and elsewhere, Kemmer and Barlow 2000, and Kemmer 2005 and 2008).

The usage-based model assumes that linguistic knowledge and language use influence each other and the linguistic knowledge is organized by entrenchment through usage. Different linguistic patterns can be entrenched with different strength depending on different usage, for example, the dimensions of how frequently the pattern is used, how easily the pattern is activated, and ultimately, how natural the pattern is judged. If the assumption of the usage-based model that the linguistic knowledge and language use are closely related is correct, the degree of frequency and the degree of processing effort should be largely correlated with the linguistic knowledge. The correlation among the empirical data of usage shown in this study supports the general assumption of the usage-based model.

The present study specifies the generally predicted relation between grammar and usage with a hypothesis regarding semantic compatibility: linguistic knowledge about the degree of semantic compatibility between a construction and a lexical item that occurs in it is correlated with frequency in use, on-line processing (what happens during the course of processing the language such as processing effort), and off-line processing (what happens after processing the language, i.e. judgments and interpretation). In order to examine the aspect of linguistic knowledge about the semantic compatibility between a verb and a construction, I analyzed the semantics of various verbs and constructions such as a sentential complement construction and a ditransitive construction in English. I categorized the verbs based on the different degrees of semantic compatibility with the constructions. The frequency in usage was examined through the collexeme analysis of the corpora regarding the co-occurrences of the constructions and the verbs. The on-line processing was investigated by means of measuring processing time of the co-occurrence. Finally, the off-line processing was examined through the acceptability (or naturalness) judgments on the sentences containing the co-occurrence. Consequently, this study showed that all these factors are largely correlated, and this supports the linguistic model proposed by the usage-based model as follows.

According to the usage-based model (Langacker 1988, 2005, and elsewhere) the knowledge about semantic compatibility between a lexical item and a construction can be understood by categorizing relationship among linguistic units and entrenchment through usage.

I will discuss the categorizing relationship between a verb and a construction and how the categorizing relationship is related with language use by using the example of the DC based on the observations in Chapter 3-5. The linguistic model can be described as in Figure 20.

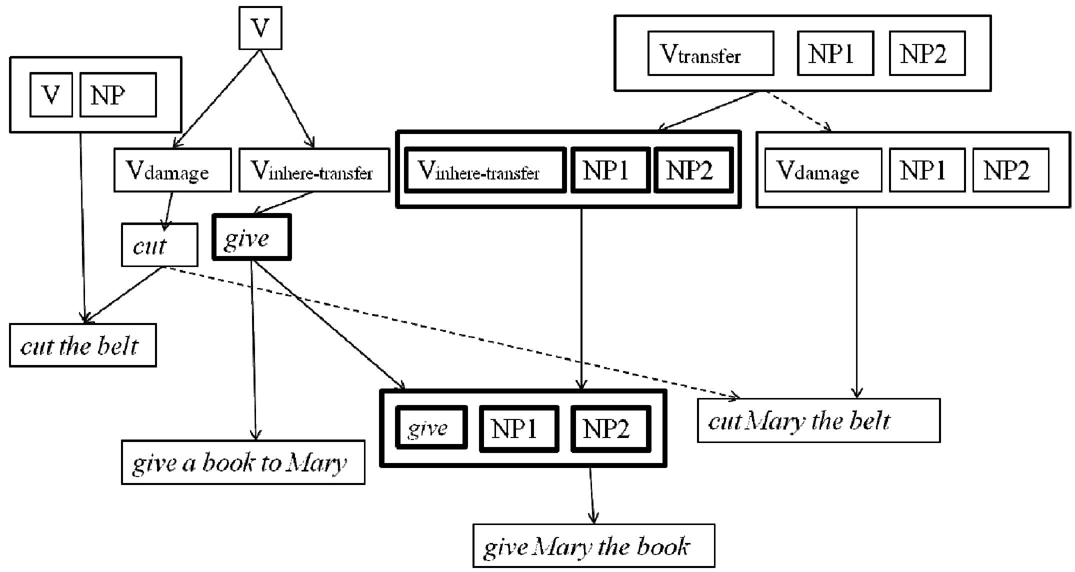

Figure 20. Categorizing relationship and semantic compatibility of the DC

In Figure 20, each box represents a linguistic unit, and the linguistic units are different in terms of level of specificity. For example, the linguistic unit *give Mary the gift* at the bottom is a specific unit whereas [$V_{transfer}$ NP1 NP2] at the top is less specific (i.e. more schematic). Also, the linguistic units are different in terms of entrenchment: the bold boxes represent more entrenched units.

When similar instances such as *give Mary the gift, send John the box*, and *pass Ann the salt* are repeated frequently, the pattern where the verb of transfer occurring with an indirect object and a direct object will be constructed as a schema ([$V_{transfer}$ NP1 NP2]). Specifically, the verbs of inherent transfer will be the most strongly entrenched, which is represented with bold lines. In speakers' mind, verbs of transfer would be the prototypical verbs that occur in the DC. Among these verbs, *give* is one of the most frequent verbs where transfer is inherently implied and this would be the most prototypical verb occurring in the DC. ([*give*], which is represented with bold line) and this verb often occurs with the DC ([*give* NP1 NP2], which is also represented with bold line). In this way, speakers will set up the relationship among the schemas. However, if verbs of damage such as *cut* are not used in the DC frequently, their co-occurrence may not be entrenched. Rather, *cut* may be more frequently used in the monotransitive construction rather than in the DC.

According to the usage-based model, not only language use contributes to constructing grammar, but also speakers produce an expression based on the constructed grammar. The instance *give Mary the book* is recognized as an instantiation of the schemas [*give*] and the DC, represented with solid lines in Figure 20. Thus, speakers can use an instance like *give Mary the book*, because they can easily categorize this instance both into the schema of the DC and into the schema of *give*. However, speakers are not likely to use *cut Mary the belt* because this instance can be categorized into the schemas of *cut* and the DC only when the schemas are extended, which is represented as the dotted lines in Figure 20.

Based on the categorizing relationship between linguistic elements and schemas set up as in Figure 20, we can discuss semantic compatibility between a verb and the DC. Here, in the speakers' mind, the verbs where transfer is inherently implied are the most semantically compatible with the DC, because their prototypical meaning (i.e. transfer of an entity from one person to another) is consistent with the prototypical meaning of the DC (i.e. transfer of possession from one person to another). Indeed, the pattern that verbs in which transfer is inherently specified are used in the DC is cognitively strongly entrenched as seen in Figure 20. However, the verbs of damage are not semantically compatible with the DC because the most prototypical meaning of these verbs does not specify the meaning of transfer. The verbs of damage and the DC can be used together only when the schemas are extended. In this way, when a verb and a construction are given, we can say how compatible they are by looking at how much their meanings overlap. Since verbs have different meanings, how much the verb meaning overlaps the constructional meaning are different depending on the verbs. In other words, there are different degrees of semantic compatibility.

Throughout the chapters in this study, the degree of semantic compatibility among the linguistic units was shown to be correlated with the facets of language use. First, frequency is correlated with the semantic compatibility. Speakers will construct the semantic compatibility between linguistic elements based on frequent use of similar patterns, and based on this constructed semantic compatibility, they will use semantically more compatible linguistic units together more frequently in turn than semantically less compatible units. The correlation between semantic compatibility and frequency was shown in 2.4 and Chapter 4. For example, the DC will be used with *give* more frequently while *cut* less frequently. Moreover, in the study of the DC in 5.3.2, the statistical result of regression on processing time with semantic compatibility and frequency are given, implies that linguistic knowledge of semantic compatibility is not independent of frequency when people process the co-occurrence of a verb and the DC.

Second, processing effort and acceptability judgments are correlated with the degree of semantic compatibility. When speakers hear an instance *give Mary the book*, in which *give* and the DC are semantically compatible, they can easily categorize it into the schema of the DC and also into *give*. Therefore, their co-occurrence is processed quite fast. Since this co-occurrence pattern is entrenched due to the frequent use and is processed fast, people would judge it acceptable. On the other hand, when people hear instances like *cut Mary the belt,* they cannot easily categorize this instance either into the DC or into the verbs of inherent transfer, because as a verb of damage, *cut* is not semantically compatible with the DC. This instance can be categorized into the schemas through extension. In other words, coercion is involved when linguistic elements that are not perfectly compatible occur together. If coercion is involved, the expression requires more time to process, and their co-occurrence will be judged less acceptable. The correlation among the semantic compatibility, processing effort, and acceptability judgments was shown in 2.2, 2.3, and Chapter 5.

In short, the present study demonstrated that linguistic knowledge and facets of language use are correlated by using specific phenomenon of language, i.e. degree of semantic compatibility. Unfortunately, this study does not answer which of the linguistic knowledge and the language use is the cause and which is the effect. If there is a systematic direction of cause and effect, i.e. whether grammar derives corresponding frequency and ease of processing or frequency and ease of processing forms grammar, this should be further investigated in the future.

Throughout the present study, I examined the data of only two constructions, which are the sentential complement construction (SCC) and the ditransitive construction (DC), and these are specifically argument structure constructions. English SCC has rather an abstract meaning and it has not been dealt with very much in Construction Grammar and Cognitive Grammar, whereas English DC has quite concrete meaning and has been widely examined by many researchers (including Goldberg 1995, Pinker 1989, and Langacker 2005, among others). At least, the resulted correlation was observed in two constructions, not limited to only one construction. It implies that other constructions may show the correlation as well. Further research on the correlation of linguistic knowledge and empirical data of usage found in other argument structure constructions (e.g. transitive, *way*-construction, and caused-motion construction), other types of construction (e.g. complement coercion, noun phrases, discussed in Chapter 1), and even constructions in other languages will support the close relation between grammar and usage.

The present study also supports the assumption of the usage-based model that "grammaticality" or "well-formedness" is not a binary concept of "grammatical / ungrammatical," but a matter of how much a linguistic pattern is cognitively entrenched (Langacker 2005): how frequently the similar pattern is used, how easily the instance is categorized as a member of a certain schema, and how acceptable people judge the instance. I showed that semantic compatibility between linguistic units is a gradable concept, and so are the frequency, processing effort, and acceptability judgments, as the empirical data demonstrate. In other words, co-occurrence of two linguistic units is not a matter of 'they co-occur because they are compatible and the co-occurring expression is grammatical' or 'they cannot co-occur because they are incompatible and the co-occurring expression is ungrammatical.' Rather it is a matter of degree: 'they are more or less likely to co-occur.' We cannot strictly say that this linguistic unit cannot be used with that unit because they can be combined with some degrees of more processing effort to resolve the incompatibility.

Accepting the gradient nature of semantic compatibility and the correlated aspects of language use, the present study provides more dynamic model of the composition of a lexical item and a construction and coercion than Construction Grammar does.

First, this study shows that both the lexical meaning and the constructional meaning "interact" with each other to resolve any degree of semantic incompatibility between the units, unlike the one-sided mechanism of the Override Principle (Michaelis 2005), in which the constructional meaning overrides the lexical meaning. Also, we cannot always point out which semantic properties of the lexical item change in order to conform to those of the construction because the way the incompatibility is resolved differs depending on the lexical items and given linguistic and non-linguistic contexts.

Second, the different degrees shown in empirical data in this study supports the linguistic model of the usage-based model regarding linguistic composition: the possibility that a lexical item and a construction can co-occur is established by cognitive entrenchment through usage, rather than a constructional meaning licenses a particular verb as Goldberg (1995) claims. Goldberg (1995) views that a construction has a prototypical meaning along with other related meanings (i.e. constructional polysemy) and these meanings license particular kinds of verbs. On this view, when there is an expression where a verb occurs in a construction, great portion of meaning of the expression is attributed to construction while the meaning of a lexical item is kept limited. For example, according to Goldberg (1995), the prototypical meaning of the DC is "transfer of possession" and there are related meanings such as "intended transfer" (as in *I baked her a cake*, in which it is not clear whether or not the cake was transferred but it is clear that the Agent baked a cake with the intention to transfer it to the Recipient) and "prevented transfer" (as in *I refused her the money*). The DC with the prototypical meaning licenses the verbs of transfer such as *send, pass*, and *hand*, the DC with the meaning of "intended transfer" licenses creation verbs such as *make* and *bake*, and the DC with the meaning of "prevented transfer" licenses the refusal verbs such as *refuse* and *deny* (Goldberg 1995). In this model, what is polysemous is the construction, not the verbs: the verbs have one or at least only a few general meanings and the general meaning is specified in the construction to which it is licensed. Therefore, a great deal of the meaning of the expression where the verb and the construction co-occur comes from the construction (Goldberg 1995).

However, according to the definition of "construction" in Construction

Grammar, there is no difference between a lexical item and a construction. If so, asking which is polysemous and which is monosemous is not a valid question (Langacker 2005). Rather, as the usage-based model proposed and this study supports, the meaning of an expression is semantic integration of both the linguistic components, which can be lexical items or constructions, and extra linguistic contexts. Therefore, we cannot strictly determine which part of the expression contributes to the whole meaning of the expression how much.

Also, Goldberg's model of constructional polysemy does not explain why there are different degrees of frequency, processing time, and acceptability judgments depending on the verbs, while the present study relates them with different degrees of semantic compatibility constructed according to different degrees of entrenchment through usage. Let us suppose again, following constructional polysemy account, that the DC is polysemous having "physical transfer," "intended transfer" and "prevented transfer," and each licenses *give, bake* and *refuse*, respectively. In the constructional polysemy model, there is no way to explain why *refuse* in the DC is processed slower than *give* in the DC, and *bake* in the middle, because each verb is validly licensed by each polysemous construction.

It is possible to claim that frequency affects processing effort: *give* is processed in the DC faster than *refuse* because it is used more frequently in general (regardless of the co-occurring construction), as there is a tendency that more frequently used word is processed faster (McGregor 2009). Or it is possible to say that *give* is processed faster in the DC because 'physical transfer' is more prototypical. Where does the prototypicality come from? Prototype is a 'schematized representation of typical instances' (Langacker 1988:133). In other words, the prototypical meaning rises from the instances in usage. Consequently, we cannot help drawing in the linguistic instances, i.e. linguistic usage, which is the idea of the usage-based model: if certain pattern is used more frequently, the pattern is more entrenched, and thus, processed faster, and frequently used, in turn.

In addition, constructional polysemy account does not explain how a verb that is not expected to occur in the construction can sometimes occur in the construction in the first place. If a lexical item that is newly used with a construction but does not belong to any of the verb categories that are made reference to one of the constructional meanings, how do we license the verb to one of the constructional meanings? For example, in Table 9 in 3.2.1 among the verb subcategories that Goldberg (1995) and Pinker (1989) proposed to occur in the DC, there is no verb such as *cause* and *provide*, but they actually occur in the corpus. We may need to coerce the verb into the constructional meaning, but in this way, coercion seems to be a process which is applied to exceptional cases that are not licensed by the constructional meanings. However, how can we decide which is an exceptional case and which is not? As Goldberg implicitly assumes throughout her works, semantic compatibility is a gradient concept, and as this study showed, coercion is not a concept of “occurring in exceptional cases” or “not occurring in typical cases.” Rather, I claim that coercion can be applied whenever there is any amount of semantic incompatibility. A construction and a verb which are quite unexpected to co-occur can be used together by some degree of coercion.

Consequently, I claim that looking at actual data of language use helps us understand better how speakers combine linguistic elements in order to make a larger unit: speakers do not speak and comprehend an expression where a construction and a lexical item co-occur with a sharp distinction of “they can be combined” or “they cannot be combined.” Rather, speakers combine the linguistic elements depending on their knowledge about degree of semantic compatibility between the linguistic units, which is built through language use, and even not very incompatible units can be combined with greater coercion.

Then, what do the analysis of semantic compatibility and its correlation with empirical data suggest regarding the nature of coercion?

I claim that coercion should be viewed as an actual psychological process of resolving the incompatibility in order to make sense of the utterance. The previous studies (Croft 1991, Pustejovsky 1995, Michaelis 2005, Panther and Thornburg 1999, 2000, Ziegeler 2007a, 2007b) viewed coercion as a theoretical explanation about the resolution of semantic incompatibility. They theoretically analyzed certain expressions on the assumption that there is semantic incompatibility (no matter how incompatible the linguistic components are) and this incompatibility is resolved, i.e. coercion occurs (no matter how hard the incompatibility is resolved). On this view, the actual psychological processing effort is not focused and both semantic compatibility and coercion are viewed as binary concepts, not a matter of degree. Therefore, on this view, we cannot explain why greater semantic incompatibility requires more processing time for resolution.

Actually, as I introduced in 1.3, the view that coercion is a psychological phenomenon is supported by some of the previous studies of the processing time experiments (Piñango et al. 1999, Piñango et al. 2006, McElree et al. 2001, and Traxler et al. 2005). While these studies show that coercion occurs during the course of composition or compared the processing time when there is no incompatibility with the processing time when there is incompatibility, I further show that the processing effort for coercion gets different according to the degree of semantic compatibility.

If we see coercion as a psychological process and a matter of degree, it is hard to decide whether a certain expression is a case of coercion or not. In other words, it is hard to draw a boundary of coercion. For example, in 2.3.3.2 and 5.4.2, when a lexical item is highly incompatible with the construction (e.g. *hit* in the SCC and *break* in the DC), this incompatibility was hard to be resolved, and thus, the occurrences were judged close to "not natural at all." In these cases, their co-occurrence required greater processing effort, and this implies that the participants tried to resolve the incompatibility any way, probably by creating an appropriate context where the co-occurrence can be acceptable, even though they fail to resolve it. If the psychological process to resolve the incompatibility is considered as coercion, we cannot simply conclude that coercion is not involved at all just for the reason that the incompatibility is not resolved. Moreover, people may resolve the incompatibility if they can posit an appropriate context by taking longer processing time. In the interviews, some participants could resolve the incompatibility between *break* and the DC by positing the possible context where the Recipient wants the Patient to be broken. Or the incompatibility may be resolved more easily if some more contextual information is given, as suggested in 1.3.4: *She* <u>*squinted*</u> *into the room* sounds more natural when *She looked into the room,* is posited (Kemmer 2005). Therefore, the gradient pattern of empirical data of processing time and the interview supports the claim that coercion should be viewed as a psychological process and as a gradient phenomenon.

Next, I claim that coercion is ultimately semantic integration of linguistic and non linguistic elements. Most studies on coercion (Michaelis 2005, Piñango et al. 2006, Piñango et al. 1999, Pustejovsky 1989, Traxler et al. 2002, and Ziegeler 2007a, b) have focused on the semantics of the target lexical item and the construction, and how the semantic features of the target lexical item is theoretically operated to conform to the constructional semantics. However, the present study shows that coercion is not only the matter of semantic incompatibility between a lexical item and a construction, but it should be accounted for along with both linguistic and non-linguistic context.

First, in order to fully understand the coercion, we need to consider linguistic contexts other than the target lexical item and the construction. The individual instances found in the corpus showed that some verbs can occur in the DC when limited linguistic contexts are given. For example, as shown in 4.3, *cause, owe*, and *run* can occur in the DC only when the second NP (Patient) is limited as an event of negative connotation, money, and water, respectively. The experimental results showed that people processed slowly and judged not very acceptable when the second NPs in the experiment sentences did not belong to the aforementioned noun semantic categories.

Also, when speakers are given a co-occurrence of incompatible lexical item and a construction, speakers may exploit non-linguistic context in order to resolve the incompatibility. In other words, speakers think of a situation where the incompatible verb and the construction might be used together as in the case of *break* in the DC, as shown in 5.5.6.

Moreover, it turned out that coercion involves more complex interaction between the verb meaning and constructional meaning, not simply in the way that verb meaning is overridden by the constructional meaning, as I pointed out several times. It seems true that, in most cases, the lexical meaning is overridden by the constructional meaning when it occurs in the incompatible construction. However, I showed that the verb meaning can affect or restrict the form and meaning of the construction, and sometimes even the constructional meaning is overridden.

One of the examples of verb meaning restricting the constructional form and meaning is that, in the case of the SCC, the deonticity of the meaning of the verb restricts the syntactic form of the SC. For example, in the corpus, when weak attempt verbs (e.g. *recommend,* and *request*) strong attempt verbs (e.g. *require* and *advise*) are used in the SCC, the complement was used with auxiliaries such as *should*, and *ought to*. Even though excluded from this study, these verbs usually occur with the SC of subjunctive mood.

The examples of verb meaning overriding construction meaning are these: when verbs of prevented transfer, such as *refuse*, occur in the DC, transfer is prohibited due to the verbal meaning. When verbs of impossible verbs, such as *break*, occur in the DC, the whole expression is interpreted only as the benefactive meaning, which is implicit in the event of transfer, while the meaning of transfer is suppressed. In addition, *cause* overrides the benefactive meaning of the construction while the metaphorical transfer meaning is profiled. Consequently, coercion works not in one-way direction where the verb meaning is overridden, but works in the way the lexical meaning and constructional meaning interact with each other.

In sum, when coercion occurs, there are various factors that should be accounted for as well as the incompatibility between the lexical item and the construction. As this study shows, coercion is an integration process where the semantics of target lexical item and the construction interact, involving other linguistic contexts surrounding them and non-linguistic contexts. The present study mainly focused on the influence of semantic compatibility on coercion, but we can further investigate the influence of linguistic or non-linguistic contexts through corpora and elaborately designed experiments. Also, I have not found a systematic pattern in which semantic incompatibility is resolved because the way the incompatibility is resolved was various depending on the examined lexical item and construction. If there is any systematicity, to explore systematic patterns of coercion is one way to expand this study.

Finally, semantic 'resemblance' or 'overlap' between the lexical item and the construction plays an important role for coercion when people encounter an unfamiliar co-occurrence of a lexical item. For example, as shown in 5.5.6, some Latin origin verbs of transfer (e.g. *present* and *donate*) and verbs which show slight different semantics from the verbs of transfer (e.g. *whisper* and *push*) did not occur in the DC according to the corpus and linguists' observation. However, when sentences where these verbs occurred in the DC were given in the experiment, the sentences were processed faster and judged more acceptable than the occurrences with the verbs of impossible transfer. The semantics of these verbs are quite similar with the semantics of the DC in that the entity used with these verbs can be transferred. These verbs have not been used in the DC probably due to the reasons, such as the detailed semantic difference, phonology and etymology, so there is a divergence of frequency and experimental results. Even though this divergence from the correlation should be investigated more in depth, at least, this experimental result implies that the general semantic overlap between the verb and the construction can affect the possibility of their co-occurrence.

In conclusion, I claim that coercion is a dynamic phenomenon in three senses. First, it is a phenomenon that cannot be explained in terms of one theoretical mechanism such as linguistic features or metonymy. Rather, according to the usage-based model, coercion is a psychological processing, a part of semantic composition processing, which is closely related with language use. Second, coercion is not simply a phenomenon of dichotomous nature as occurring or not occurring. Instead, it is a matter of degree. The gradient nature of semantic compatibility and coercion was observed through the four aspects of language mentioned above. Last, the ways the verb meaning and the constructional meaning interact for coercion are various depending on the construction and the lexical item, and it involves linguistic and non-linguistic contexts.

The gradient and dynamic nature of coercion and the correlation of semantic compatibility with empirical data of language use challenge the generativists' view that 'a grammar is a self-contained set of statements and rules specifying how an expression is constructed and these statements and rules determine the outputs' (as cited from Langacker 1988). If this view is correct, coerced expression should not be produced nor judged (somewhat) acceptable because the limited set of statements and rules will determine which units are compatible and which are not, and therefore, only compatible collocations will be produced as outputs. However, as the corpus data showed, the co-occurrences that were not expected to be used were actually spoken. Also, the acceptability judgments scores varied from "not acceptable" to "acceptable" involving intermediate acceptability as well.

The generativists may regard the gradient results of the frequency, acceptability judgments, and processing time, i.e. usage, as "linguistic performance," and may not want to extensively discuss the performance because their main concern in "linguistic competence," i.e. linguistic knowledge. From their point of view, the performance (the usage) and the competence (linguistic knowledge) are independent. This may imply that the usage pattern and the linguistic knowledge are not necessarily related. However, this study showed that the linguistic knowledge of semantic compatibility and the three aspects of usage are all correlated in general. It is true that there were some cases of divergence among these facets (e.g. *buy, owe, put*, etc in 4.3.3 and 5.5). Most of these cases could be explained with more detailed examination of semantics and frequency association with other linguistic/non-linguistic contexts. This suggests that the linguistic knowledge and the usage are not independent with each other, and this was supported by the correlated pattern in 2.3.3 and the regression result in 5.3.

Some may claim that correlating the degrees of semantic compatibility with frequency and processing is circular because the different degrees of semantic compatibility established in this study in 2.1 and Chapter 3 may have been affected by the usage, and therefore, their correlation is a natural consequence. I admit that when I set up the semantic compatibility, the linguistic usage may have influenced on establishing the degree of semantic compatibility, even though I tried to avoid circularity by consulting the linguists' analysis (Givón 1980, Goldberg 1995, Pinker 1989) and dictionaries, not looking at the frequency information itself. The possibility that semantic compatibility is influenced by language use, however, actually supports the claim of this study that linguistic knowledge is not separable from the usage. Consequently, it seems that observing linguistic competence without ever being affected by the usage is impossible.

The assumption of the usage-based model that linguistic knowledge is influenced by the usage implies that different pattern of language use may lead to different linguistic knowledge, and linguistic knowledge is subject to change. This implication leads us to the diachronic change of the linguistic knowledge and language use. If less compatible collocations are used repeatedly and entrenched, our knowledge about the compatibility between the linguistic units will be changed, and finally, this change will be reflected in the usage data over time. Some previous studies (Hilpert 2008, Israel 1996, Traugott 2007) showed how constructions, such as Germanic future construction, English *way*-construction, and English degree modifier construction, evolved through time by using corpora, even though they did not directly addressed the correlation between the different degrees of semantic compatibility and coercion with language use. The diachronic study will be another piece of good evidence to show that linguistic use does affect linguistic knowledge and show the dynamic aspect of language on compatibility. I will leave the diachronic research on semantic compatibility and coercion for future study.

Lastly, I claim that coercion obliterates the distinction of syntax, semantics, and pragmatics. Construction Grammar and the usage-based model assume that a construction is a paring of form and meaning. Then, if speakers judge *John cut Jane the belt* not perfectly acceptable, is it because of the syntactic problem of semantic problem? We can say that it is the syntactic problem of subcategorization frame of *give* and *cut*: *give* subcategorize for three arguments while *cut* two. However, we can also say that it is semantic problem in that *cut* usually does not carry the meaning of transfer, unlike the meaning of the DC. In short, the distinction between syntax and semantics is not clear. Moreover, the fact that this sentence can be more acceptable when appropriate linguistic or non-linguistic contexts are given shows that there is no distinction of semantics and pragmatics. Consequently, production and comprehension of a linguistic expression is semantic integration that incorporates not only linguistic knowledge of the linguistic items but also contextual knowledge.

In conclusion, coercion examined in this study challenges the view about language that is dichotomous (competence vs. performance / grammatical vs. ungrammatical / syntax vs. semantics / semantics vs. pragmatics) and provides the view that these concepts are gradable.

This study revealed dynamic nature of semantic compatibility and coercion, by incorporating empirical data of frequency, processing, and acceptability judgments. I claim that this dynamic nature of semantic compatibility and coercion reflects the dynamic nature of language: linguistic knowledge closely interacts with language use, and thus, linguistic knowledge can be accommodated by the language use, and in turn, this flexible linguistic knowledge enables speakers to produce and comprehend creative and unfamiliar expressions.

Bibliography

Barlow, M. 2004, 1996. *MonoConc Pro*. Version 2.2. Athelstan.

Biber, D., S. Johansson, G. Leech, S. Conrad, and E. Finegan. 1999. *Longman Grammar of Spoken and Written English*. Harlow, England; [New York] : Longman, 1999.

Bolinger, D. 1965. The automization of meaning. *Language 41*, 555-573.

Bresnan, J. 2007. Is syntactic knowledge probabilistic?: Experiments with the English dative alternation. In S. Featherston and W. Sternefeld (Eds.), *Roots: Linguistics in Search of Its Evidential Base*. Series: Studies in Generative Grammar, 77-96. Berlin: Mouton de Gruyter.

Bresnan, J. and M. Ford. 2010. Predicting syntax: Processing dative constructions in American and Australian varieties of English. *Language 86.* 168-213.

Bresnan, J. and T. Nikitina. The Gradience of the Dative Alternation. In L. Uyechi and L. H. Wee (Eds.), *Reality Exploration and Discovery: Pattern Interaction in Language and Life*, 161-184. Stanford: CSLI Publications.

Broccias, C., & Hollman, W. B. (2007). Do we need summary and sequential scanning in (cognitive) grammar? *Cognitive Linguistics, 18*, 487-522.

Chomsky, N. 1995. The Minimalist Program. Cambridge, MA: The MIT Press.

Chomsky, N. 1965. *Aspects and the Theory of Syntax*. Cambridge, MA: The MIT Press.

Chomsky, N. 1957. *Syntactic Structures*. The Hague: Mouton.

Cowart, W. 1997. Experimental Syntax: Applying Objective Methods to Sentence Judgments. Thousand Oaks, California: SAGE Publications.

Croft, W. 1991. *Syntactic Categories and Grammatical Relations: The Cognitive*

Organization of Information. Chicago; London: The University of Chicago Press.

Dohrmann, E. and C. D. Dzikus. 2007. *Enriched Composition: Types and Theories*. http://www2.informatik.hu-berlin.de/~dzikus/material/referat3.pdf

Evans, V. and M. Green. 2006. *Cognitive Linguistics: An Introduction*. Edinburgh: Edinburgh University.

Fillmore, C. J. 1975. An Alternative to Checklist Theories of Meaning. *BLS 1*, 123-131.

Fillmore, C. J. and B. T. Atkins. 1992. Towards a frame-based organization of the lexicon: the semantics of RISK and its neighbors. In A. Lehrer and E. Kittay (Eds.), *Frames, Fields, and Contrasts: New Essays in Semantics and Lexical Organization*, 75-102. Hillsdale: Lawrence Erlbaum.

Fox Tree, J. E. and J. C. Schrock. 2002. Basic meanings of *you know* and *I mean*. *Journal of Pragmatics* 34, 727 – 747.

Givón, T. 1980. The binding hierarchy and the typology of complements. *Studies in Language, 4*, 333-377.

Goldberg, A. E. 2009a. The nature of generalization in language. *Cognitive Linguistics* 20. 93-128.

Goldberg, A. E. 2009b. Constructions work. *Cognitive Linguistics* 20. 201-224.

Goldberg, A. E. 2006. Constructions at work: The nature of generalization in language. New York: Oxford University Press.

Goldberg, A. E. 1998. Patterns of experience in patterns of language. In M. Tomasello (Ed.), *The new psychology of language: Cognitive and functional approaches to language structure,* 203 – 218. London: Lawrence Erlbaum.

Goldberg, A. E. 1997. Making one's way through the data. In A. Alsina, J. Bresnan, and P. Sells (Eds.), *Complex predicates*, 151 – 173. Stanford, CA: CSLI Publications.

Goldberg, A. E. 1995. Constructions: A construction grammar approach to argument structure. Chicago: University of Chicago Press.

Goldinger, S.D. 1996. Words and voices: Episodic traces in spoken word identification and recognition memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition 22*, 1166-1183.

Goldinger, S.D. 1998. Echoes of echoes?: An episodic theory of lexical access. *Psychological Review 105*, 251-279.

Gropen, J., S. Pinker, M. Hollander, R. Goldberg, and R. Wilson. 1989. The learnability and acquisition of the dative alternation in English. *Language 65*, 203-257.

Hare, M. L., K. McRae, and J. L. Elman. 2003. Sense and structure: Meaning as a determinant of verb subcategorization preference. *Journal of Memory and Language 48*, 281-303.

Hilpert, M. 2008. *Germanic Future Constructions A Usage-based Approach to Language Change.* Amsterdam & Philadelphia: John Benjamins.

Israel, M. 1996. The *Way* Constructions Grow. In A. Goldberg (ed.). *Conceptual Structure, Discourse and Language*, 217-230. Stanford: CSLI.

Kemmer, S. 2008, September. *New dimensions of dimensions: Frequency, productivity, domains and coercion*. Paper Presented at the meeting of Cognitive Linguistics Between Universality and Variation, Dubrovnik, Croatia.

Kemmer, S. 2005, October. *Constructional profiles as the basis of semantic analysis*. Paper presented at the meeting of New Directions in Cognitive Linguistics, Dubrovnik, Croatia.

Kemmer, S. and M. Barlow. 2000. Introduction: A usage-based conception of language. In M. Barlow and S. Kemmer (Eds.), *Usage-based models of grammar*, vii -xxviii. Stanford, CA: CSLI Publications.

Kemmer, S. and M. Israel. 1994. Variation and the Usage-Based Model. *Proceedings of the 34th Annual Meeting of the Chicago Linguistic Society*. Chicago: CLS.

Kemmer, S., & Verhagen, A. (1994). The grammar of causatives and the conceptual structure of events. *Cognitive Linguistics, 5*, 115-156.

Kövecses, Z. and G. Radden. 1998. Metonymy: Developing a Cognitive Linguistic View. *Cognitive Linguistics 9*, 37-77.

Lakoff, G. 1987. Women, Fire, and Dangerous Things: What Categories Reveal about the Mind. Chicago; London: The University of Chicago Press.

Lakoff, G. and M. Johnson. 1980. *Metaphors we live by*. Chicago: University of Chicago Press.

Langacker, R. W. 2009. Cognitive (construction) grammar. *Cognitive Linguistics* 20. 167-176.

Langacker, R. W. 2008. *Cognitive Grammar: A Basic Introduction*. New York: Oxford University Press.

Langacker, R. W. 2005. Construction Grammars: Cognitive, Radical, and Less So. Francisco J. Ruiz de Mendoza Ibáñez and M. Sandra Peña Cervel (Eds.), *Cognitive Linguistics: Internal Dynamics and Interdisciplinary Interaction*, 101-159. Berlin and New York: Mouton de Gruyter. Cognitive Linguistics Research 32.

Langacker, R. W. 1988. A usage-based model. In B. Rudzke-Ostyn (Ed.), *Topics in cognitive linguistics*, 127-161. Amsterdam: Benjamins.

Langacker, R. W. 1987. *Foundations of Cognitive Grammar*, *Vol. 2*. Stanford

University Press.

Levinson, S. 2000. Presumptive Meanings: The Theory of Generalized Conversational Implicature. Cambridge, MA: The MIT Press.

MacDonald, M. 1999. A probabilistic constraints approach to language acquisition and processing. *Cognitive Science* 23, 569 – 588.

McElree, B., M. J. Traxler, M. J. Pickering, R.E., Seely, and R. Jackendoff. 2001. Reading time evidence for enriched semantic composition. *Cognition 78*, B15-B25.

McGregor, W. B. 2009. *Linguistics: An Introduction*. New York; London: Continuum International Publishing Group.

Michaelis, L. A. 2005. Entity and event coercion in a symbolic theory of syntax. In J. Östman, and M. Fried (Eds.), *Construction grammars: Cognitive grounding and theoretical extensions,* 45 – 88. Amsterdam; Philadelphia: John Benjamins Publishing Company.

Michaelis. L. A. 2004. Type shifting in construction grammar: An integrated approach to aspectual coercion. *Cognitive Linguistics 15*, 1-67.

Michaelis, L. 2003. Headless constructions and coercion by construction. In E. Francis and L. Michaelis (Eds.), *Mismatch: Form-Function Incongruity and the Architecture of Grammar*, 259-310. Stanford CA: CSLI.

Newmeyer, F. J. 2003. Grammar is grammar and usage is usage. *Language 79*, 682-707.

Panther, K.-U. and L. L. Thornburg. 1999. Coercion and Metonymy: The Interaction of Constructional and Lexical Meaning. In B. Lewandowska-Tomaszczyk (ed.), Cognitive Perspectives on Language, 37-51. Frankfurt am Main; Berlin; Bern; Bruxelles; New York; Wien: Lang.

Piñango, M. M., A. Winnick, R. Ullah, and E. Zurif. 2006. Time-course of semantic composition: The case of aspectual coercion. *Journal of Psycholinguistic Research 35*, 233-244.

Pinker, S. 1989. Learnability and Cognition: the Acquisition of Argument Structure. Cambridge, MA: The MIT Press.

Piñango, M. M., A., E. Zurif, and R. Jackendoff. 1999. Real-time processing implications of aspectual coercion at the syntax-semantics interface. *Journal of Psycholinguistic Research 28*, 395-414.

Pustejovsky, J. 1995. Linguistic Constraints on Type Coercion. In P. Saint-Dizier and E. Viegas (eds.), *Computational Lexical Semantics*, 71-97. Cambridge; New York; Melbourne: Cambridge University Press.

Pustejovsky, J. 1989. *Type coercion and selection*. Paper presented at West Coast Conference on Formal Linguistics. Vancouver.

Reddy, M. 1979. The Conduit Metaphor. In A. Ortony (Ed.), *Metaphor and Thought*, 284-324. Cambridge: Cambridge University Press.

Rosch, E. 1977. Human Categorization. In N. Warren, (Ed.), *Advances in Cross-Cultural Psychology 1*: 1-72. Academic Press.

Rosch, E. 1973. Natural categories. *Cognitive Psychology 4*, 328–350.

Ruiz de Mendoza Ibáñez, F. and Perez Hernández. L. 2001. Metonymy and grammar: motivation, constraints and interaction. *Language and Communication 21*, 321-357.

Sag, I. A., and T. Wasow. 1999. *Syntactic Theory: A formal introduction.* Stanford: CSLI Publications.

Sinclair, John. (Editor in chief). 2001. *Collins Cobuild English Dictionary for Advanced Learners*, an electronic version. London: HarperCollins Publishers.

Sinclair, John. (Editor in chief). 1987. *Collins Cobuild English Language Dictionary*. London: Collins.

Stefanowitsch, A. and S. Th.Gries. 2003. Collostructions: Investigating the interaction of words and constructions. *International Journal of Corpus Linguistics 8*, 209-243.

Saussure, F. 1916. *Cours de linguistique générale*. Paries: Payet, 1973. Translated by W. Baskin. New York: McGraw Hill, 1976.

Talmy, L. 2000. Toward a Cognitive Semantics: Vol 1. Concept Structuring Systems. Cambridge, MA: The MIT Press.

Thompson, S. A. and A. Mulac. 1991. The discourse conditions for the use of the comoplementizer that in conversational English. *Journal of Pragmatics* 15, 237 – 251.

Traugott, E. C. 2007. The Concepts of Constructional Mismatch and Type-Shifting from the Perspective of Grammaticalization. *Cognitive Linguistics 18*, 523-557.

Traxler, M. J., M. J. Pickering, and B. McElree. 2002. Coercion in sentence processing: evidence from eye-movements and self-paced reading. *Journal of Memory and Language 47*, 530-547.

Wierzbicka, A. 1996. Conditionals and counterfactuals: Conceptual primitives and linguistic universals. In A. Athanasiadou and R. Dirven (eds.) *On Conditionals Again*, 15-59. Amsterdam: John Benjamins.

Ziegeler, D. 2007a. A word of caution on coercion. *Journal of Pragmatics 39*, 990-1028.

Ziegeler, D. 2007b. Arguing the case against coercion. In G. Radden, K.-M. Köpcke, & T. B. P. Siemund (Eds.), *Aspects of meaning construction* (pp. 99-123).

Amsterdam ; Philadelphia : John Benjamins.

Zwicky, A. 1971. In a manner of speaking. *Linguistic Inquiry 2*, 223-233.

Appendix 1

Web-based Survey Materials for the Sentential Complement Construction

1 John remembered that Margaret only read best sellers of the year.

2 Danny saw that Maggie's grandmother drank Starbucks coffee recently.

3 Tom instructed that Johnny often swam in his private pool all summer.

4 Jenny liked that John gave her a ride to the office every day.

5 Thomas said that Kelly sold women's accessories at the new store.

6 Susan ordered that Jim went to school by bike on Thursday and Friday.

7 Bill advised that Ken worked in a small town as a police officer.

8 Barbara knew that the editor published very cheap magazines.

9 Mary told that Kelly read two local newspapers in the morning.

10 Billy taught that the researcher invented very unique products.

11 Jill caused that the man delivered fresh milk to every other house.

12 Kim pretended that John took a shower three times a day in July.

13 Sally meant that Nora typed on the computer much faster than John.

14 Billy made that Andrew went to the small park to jog on Saturday.

15 John thought that Jill went to the Japanese Restaurant three times a week.

16 Robert broke that Cindy took care of her neighbor's child during the day.

17 Jill wanted that Jim frequently donated large sums to charity.

18 Cindy helped that Uncle Bob gave Tim delicious candies for Christmas.

19 Billy hit that his father drank a glass of wine every evening.

20 Robert learned that Rosie bought frozen food at the new grocery store.

21 Katie threw that Sally called her mother in Wisconsin on Friday.

22 Rosie hated that Katie brought the heavy laptop to the office.

23 Billy meant that his mother watched the TV show every Tuesday.

24 Ann hated that the girl often sang the songs from the 1980's.

25 Cathy threw that Beth listened to the radio show at 6: 30.

26 Susan ordered that the professor dealt with World War II in his book.

27 Tom remembered that Ann wrote in her journal almost every day.

28 Beth knew that Ted visited his parents in New York in the summer.

29 Bill hit that Beth saved her files in other computers as a backup.

30 Katie wanted that Robert played soccer with his friends as exercise.

31 Charlie learned that Linus carried his blue blanket all over the place.

32 Charlie thought that Lucy gave private piano lessons to children.

33 Bob instructed that the heavy man broke restaurant chairs all the time.

34 Lucy helped that the old woman invited her neighbors to her house.

35 Danny said that John paid about seven dollars for water per month.

36 Ann told that the couple celebrated their wedding every year.

37 Susan liked that Mary often went to classical music concerts.

38 Lucy advised that James trained animals from Africa at the zoo.

39 Katie made that the young actor threw a big party at his garden.

40 John pretended that his brother ran a nice barbecue restaurant.

41 Larry broke that Jane majored in economics at UCLA.

42 Larry taught that Mary sometimes played the violin as a hobby.

43 Jimmy saw that Lucy often prayed for the poor people around her.

44 Billy caused that Ted woke up at 11:30 in the morning.

Appendix 2

Experiment Materials for the Sentential Complement Construction

1 John thought that Jill went to the Japanese Restaurant three times a week.

2 Barbara thought that Jim gave private piano lessons to children.

3 Katherine learned that Ted bought frozen food at the new grocery store.

4 Barbara learned that John carried his blue blanket all over the place.

5 Katherine saw that Ann's grandmother drank Starbucks coffee recently.

6 Barbara saw that Jill often prayed for the poor people around her.

7 Sally meant that John typed on the computer much faster than Nora.

8 Billy meant that his mother watched the TV show every Tuesday.

9 Billy taught that the researcher invented very unique products.

10 Katherine taught that Jill sometimes played the violin as a hobby.

11 Bill advised that ken worked in a small town as a police officer.

12 Lucy advised that James trained animals from Africa at the zoo.

13 Jill caused that the man delivered fresh milk to every other house.

14 Billy caused that Ted woke up at eleven thirty in the morning.

15 Billy hit that his father drank a glass of wine every evening.

16 Bill hit that Beth saved her files in other computers as a backup.

Appendix 3

The Result of the Collexeme Analysis of the Sentential Complement Construction

Rank	Verb	Uses in SCC	Number of Instances	*p*	Collo_Strength
1	*say*	1088	8526	0	∞[50]
2	*suggest*	196	748	1.5E-152	151.8142
3	*believe*	153	549	1.3E-123	122.8785
4	*think*	321	3868	1.9E-98	97.72035
5	*indicate*	127	548	8.15E-92	91.08879
6	*assume*	75	222	2.94E-68	67.53142
7	*hope*	80	269	1.11E-67	66.9543
8	*know*	255	3473	2.83E-67	66.54813
9	*ensure*	66	160	4.49E-67	66.34813
10	*feel*	86	549	6.51E-48	47.18653
11	*agree*	75	600	4.01E-35	34.39659
12	*argue*	44	203	2E-31	30.69846
13	*note*	35	115	7.51E-31	30.12457
14	*recognize*	38	179	5.36E-27	26.27112
15	*acknowledge*	23	80	3.74E-20	19.42756
16	*decide*	46	500	8.02E-17	16.09586
17	*understand*	54	727	1.8E-15	14.74542
18	*ask*	3	1964	2.79E-14	13.55366
19	*imply*	17	70	6.24E-14	13.20483
20	*guarantee*	18	82	7.66E-14	13.11549
21	*assure*	17	84	1.54E-12	11.81284
22	*show*	38	471	2.09E-12	11.67907
23	*tell*	1	1472	2.29E-12	11.64037
24	*imagine*	21	142	2.39E-12	11.62148
25	*confirm*	20	130	3.73E-12	11.42879
26	*expect*	42	591	9.24E-12	11.03414
27	*emphasize*	19	124	1.37E-11	10.86203
28	*like*	1	1316	7.02E-11	10.15391
29	*mention*	36	492	1.21E-10	9.916517

[50] The collostruction strength of *give* was so strong that the strength was almost infinity.

30	*notice*	14	69	1.36E-10	9.865109
31	*realize*	13	59	2.07E-10	9.68369
32	*read*	3	1156	2.04E-07	6.689608
33	*discuss*	2	956	9.66E-07	6.015071
34	*move*	3	1046	1.08E-06	5.966875
35	*prove*	8	42	2.1E-06	5.678364
36	*deny*	9	56	2.16E-06	5.664765
37	*conclude*	11	94	4.18E-06	5.379119
38	*provide*	3	956	6.08E-06	5.215792
39	*contend*	4	7	6.09E-06	5.21568
40	*demonstrate*	12	123	1.04E-05	4.982077
41	*state*	15	206	3.04E-05	4.51754
42	*keep*	1	648	3.94E-05	4.404079
43	*sense*	4	11	5.37E-05	4.270098
44	*certify*	5	21	5.83E-05	4.234512
45	*call*	2	711	9.33E-05	4.030037
46	*recall*	8	72	0.000123	3.910643
47	*mean-H*	5	966	0.000146	3.834638
48	*discover*	6	40	0.000164	3.785671
49	*address*	2	680	0.000195	3.709505
50	*write*	2	648	0.000258	3.588749
51	*presume*	4	17	0.000351	3.455175
52	*vouch*	2	2	0.000428	3.368783
53	*allege*	3	8	0.000458	3.33902
54	*remark*	3	8	0.000458	3.33902
55	*answer*	1	515	0.000492	3.308433
56	*prefer*	7	69	0.000567	3.2461
57	*claim*	5	35	0.000731	3.136005
58	*stress*	6	55	0.000951	3.022011
59	*hint*	3	10	0.000952	3.021517
60	*specify*	7	77	0.001096	2.960003
61	*insist*	5	39	0.001211	2.916821
62	*reaffirm*	6	58	0.001259	2.89986
63	*pretend*	3	12	0.001691	2.771737
64	*observe*	5	44	0.002098	2.678211
65	*announce*	17	361	0.00216	2.665584
66	*admit*	4	27	0.002193	2.658948
67	*assert*	4	27	0.002193	2.658948
68	*confess*	2	4	0.002496	2.602677
69	*consider*	1	429	0.003097	2.509087
70	*proclaim*	2	5	0.004104	2.386834

71	*remember*	11	210	0.004672	2.33047
72	*find*	34	993	0.004881	2.311535
73	*predict*	5	56	0.006021	2.22032
74	*dispute*	3	24	0.012939	1.888093
75	*determine*	10	217	0.015708	1.803872
76	*insure*	2	10	0.017239	1.763493
77	*conjecture*	1	1	0.020686	1.684332
78	*urge*	5	77	0.021897	1.659612
79	*reiterate*	4	52	0.022546	1.646938
80	*anticipate*	6	107	0.024112	1.617761
81	*decree*	1	2	0.040943	1.387816
82	*encourage*	1	273	0.050579	1.296028
83	*express*	1	276	0.051395	1.289078
84	*respond*	3	410	0.054653	1.262386
85	*command*	1	3	0.060782	1.216223
86	*negate*	1	3	0.060782	1.216223
87	*pledge*	2	21	0.069303	1.159249
88	*venture*	1	4	0.080211	1.095766
89	*hear*	34	1231	0.087422	1.058379
90	*push*	1	221	0.097583	1.010626
91	*release*	1	237	0.102079	0.991062
92	*editorialize*	1	6	0.117871	0.928593
93	*risk*	1	7	0.136119	0.866081
94	*suspect*	1	7	0.136119	0.866081
95	*intend*	1	204	0.137734	0.860959
96	*pursue*	1	205	0.137914	0.86039
97	*share*	1	205	0.137914	0.86039
98	*define*	1	216	0.142477	0.846255
99	*add*	9	720	0.146923	0.83291
100	*reply*	1	8	0.15399	0.812508
101	*ascertain*	1	9	0.171491	0.765759
102	*concern*	2	38	0.185372	0.731955
103	*dictate*	1	10	0.18863	0.724389
104	*visualize*	1	10	0.18863	0.724389
105	*grant*	2	39	0.192876	0.714722
106	*commit*	1	182	0.193161	0.71408
107	*reflect*	3	315	0.229591	0.639046
108	*describe*	3	322	0.233044	0.632562
109	*require*	5	437	0.23506	0.628822
110	*concur*	1	13	0.23795	0.623515
111	*figure*	2	231	0.250568	0.601074

112	*compare*	1	165	0.271314	0.566528
113	*perceive*	1	16	0.284272	0.546265
114	*verify*	1	16	0.284272	0.546265
115	*complain*	1	17	0.299079	0.524214
116	*bet*	1	18	0.313579	0.503653
117	*signal*	1	18	0.313579	0.503653
118	*communicate*	6	205	0.325405	0.487576
119	*envision*	2	59	0.345587	0.461443
120	*recommend*	7	233	0.347853	0.458604
121	*rule*	1	147	0.379766	0.420484
122	*guess*	2	65	0.390161	0.408756
123	*initiate*	1	26	0.419291	0.377484
124	*request*	3	90	0.437867	0.358658
125	*report*	12	745	0.439897	0.356649
126	*learn*	10	402	0.483083	0.315978
127	*underscore*	1	33	0.498348	0.302467
128	*charge*	1	35	0.518891	0.284924
129	*mind*	1	35	0.518891	0.284924
130	*explain*	7	275	0.521341	0.282878
131	*buy*	1	121	0.525261	0.279625
132	*volunteer*	1	39	0.557489	0.253764
133	*promise*	1	44	0.601413	0.220828
134	*testify*	1	45	0.60966	0.214913
135	*comment*	3	228	0.637978	0.195195
136	*maintain*	2	149	0.77383	0.111354
137	*accept*	5	217	0.808189	0.092487
138	*see*	77	3683	0.906781	0.042498
139	*advise*	1	75	1	0
140	*aggregate*	1	48	1	0
141	*arrange*	1	55	1	0
142	*articulate*	1	49	1	0
143	*care*	1	76	1	0
144	*convey*	1	73	1	0
145	*disagree*	1	59	1	0
146	*establish*	4	234	1	0
147	*forget*	1	74	1	0
148	*remind*	2	111	1	0
149	*repeat*	1	63	1	0
150	*speculate*	1	92	1	0
151	*undertake*	1	57	1	0
152	*wish*	1	65	1	0

Appendix 4

Experiment Materials of the Ditransitive Construction

1 Johnny gave Jill the ball while he was in town.

2 Harry sent Kate the card six days ago.

3 Sophie brought Tim the hat four hours ago.

4 Eddie told Kim the news last month.

5 Katy faxed Bob the list four weeks after he left.

6 Larry owed Jane the watch while she worked in the town.

7 Emma promised Mike the shirt last night.

8 Justin left Sue the desk last week.

9 Lucy allowed Sam the chair six minutes ago.

10 Jenny cooked Ken the egg while he stayed in her house.

11 Kevin created Jen the case four hours ago.

12 Nancy bought Ed the cat last Sunday.

13 Billy found Jane the ring while she stayed in his apartment.

14 Justin rented Jill the space five weeks after she arrived.

15 Jerry threw Kate the ring while she was moving her stuffs.

16 Karen dropped Fred the pen five minutes ago.

17 Charlie put Beth the cheese last morning.

18 Cathy set Nick the plate while they were in Houston.

19 Kevin caused Liz the fire four minutes ago.

20 Larry refused Kim the lunch while she was in his house.

21 Lucy denied Rick the chair five weeks ago.

22 David broke Jean the bread six years ago.

23 Robert cut Jane the belt last winter.

24 Ricky stayed Sue the space last evening.

25 Thomas sneezed Ann the milk while they were reading the books.

26 Sophie wished Ted the dream last night.

27 Emma wanted Jen the class six days before their wedding.

28 Justin thought Chris the ball the five days ago.

29 Alex presented Jill the page four weeks ago.

30 Mary donated Pat the clothes four weeks ago.

31 Thomas provided Kate the socks last night.

32 Eddie pushed Beth the plate five minutes ago.

33 Susan whispered Matt the song last night.

34 Larry said Ann the truth six days after they met.

35 Thomas chose Jen the pot five minutes before the show.

Appendix 5

Vectors Used for the Linear Contrast of NatScore and ProcessingT of the Ditransitive Construction

Semantic Compatibility Category	Verb	Vector
SemCom1 (Verbs of inherent transfer)	*give*	16/28-2
	send	16/28-2
	bring	16/28-2
	tell	16/28-2
	fax	16/28-2
	owe	16/28-2
	promise	16/28-2
	leave	16/28-2
	allow	16/28-2
SemCom2 (Verbs of possible transfer)	*cook*	16/28-1
	create	16/28-1
	buy	16/28-1
	find	16/28-1
	rent	16/28-1
	throw	16/28-1
	drop	16/28-1
	put	16/28-1
	set	16/28-1
	cause	16/28-1
SemCom3 (Verbs of prevented transfer)	*refuse*	16/28
	deny	16/28
SemCom4 (Verbs of impossible transfer)	*break*	16/28+1
	cut	16/28+1
SemCom5 (Verbs of events internal to the Agent)	*stay*	16/28+2
	sneeze	16/28+2
	wish	16/28+2
	want	16/28+2
	think	16/28+2